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Task Analysis of Tactical Leadership Skills for Bradley Infantry Fighting Vehicle Leaders

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Training Research Laboratory

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U. S. Army

Research Institute for the Behavioral and Social Sciences

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This report presents a task analysis of the Tactical Leadership Skills of Bradley Infantry Fighting Vehicle leaders. The task list was examined for critical training requirements, and requirements for training device support of this training were identified. Existing and projected training devices and materials were examined for adequacy in meeting each of the requirements, and recommendations were made on the identity and characteristics of devices required to support Bradley Leader training. The task (Continued)

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lists, covering squad through battalion level, provide a generic listing of
a set of mechanized infantry leadership tasks, and can be used as a data
base for other tactical training and testing program developments. Keywords:

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Task Analysis of Tactical Leadership Skills
for Bradley Infantry Fighting Vehicle Leaders

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The Army Research Institute Field Unit at Fort Benning, Georgia, has provided a vital and continuing part of the United States Army's efforts to field a combat-effective infantry fighting vehicle. The ARI involvement began with the Mechanized Infantry Combat Vehicle (MICV) of the 1970's and has grown to include the currently fielded and fully operational M2 Bradley Infantry Fighting Vehicle (BIFV). ARI has focused on improving training in individual and collective soldier skills to ensure combat effectiveness and taken a part in the field testing of the Bradley and its associated training devices.

The Army Research Institute background with the Bradley Fighting Vehicle has been one of long-standing and close support for the U.S. Army Infantry School. ARI has already expanded BIFV training materials by development of Procedures Guides for the three main operator positions of Commander, Gunner, and Driver, and is studying limited visibility operations for the Bradley. The present report describes a further effort toward increasing the effectiveness of Bradley training through a training device requirements analysis. This analysis was designed to produce recommendations pertinent to production of a formal Training Device Requirement (TDR) document for a Bradley Leader Tactical Trainer.

The concept of a Bradley Leader Trainer arose because of the Infantry School's request for consideration of requirements for simulation of tactical training. The Bradley Leader Tactical Trainer was conceptualized as a device or set of devices that could be used to teach Bradley commanders to perform their full set of individual and collective tasks, from the squad level up through the battalion level. At the same time, this trainer would incorporate the command and control skills necessary to employ the BIFV in both the mounted and dismounted mode, while offering opportunity for control of supporting and subordinate elements.

The project described in this report focuses on the task analysis component of a TDR for a Bradley Leader Tactical Trainer. It includes a determination of the tasks for which training device support is required, a statement of the characteristics required from such devices, and final recommendations. Documentation includes definition of the Bradley leader tasks that require training device support, together with backup analysis and identification of the type or types of training aids appropriate for each task.

EDGAR M. JOHNSON
Technical Director

TASK ANALYSIS OF TACTICAL LEADERSHIP SKILLS FOR BRADLEY INFANTRY FIGHTING VEHICLE LEADERS

EXECUTIVE SUMMARY
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Requirement:

This research was conducted to produce recommendations for production of
a formal Training Device Requirement for a Tactical Trainer for the various
echelons of leadership of the M2 Bradley Infantry Fighting Vehicle Unit struc-
ture. The Bradley Leader Trainer is conceptualized as a device or set of de-
vices that can be used to teach Bradley leaders to perform their full set of
individual and collective tactical tasks, from squad leader through battalion
commander level.

Procedure:

After a complete list of Bradley leader tactical tasks was developed, the
task list was analyzed for training implications. This step involved task rat-
ings and input from subject matter experts. The task list was examined to de-
termine critical training requirements, requirements for training device sup-
port of this training, and the characteristics of these training devices.
Existing and projected training devices and materials were examined for ade-
quacy in meeting each of the identified requirements, and recommendations were
made on the identity and characteristics of devices required to support Bradley
leader tactical training.

Findings:

1. The training devices that are available or will soon be available to Brad-
ley units and training centers primarily cover gunnery skills. However, this
analysis identifies and lists skills other than gunnery skills that are in
need of training device coverage. These skills, primarily in the area of tac-
tical leadership, are not covered by the existing training devices.

2. Personnel at all levels of leadership must have training on the operations,
capabilities, and limitations of the Bradley, and on maintenance and gunnery
skills required of the fighting vehicle infantryman. These basic skills are
required at all levels of command.

3. The gunnery devices that employ the BIFV itself must maximize training
potential by covering more than just simple gunnery skills whenever possible.
Tactical situations should be simulated wherever practical, with opportunities
for full crew interaction, including activities for the driver, and mounted
and dismounted battle drills for the troops riding in the back of the vehicle.

4. The large-scale combined arms tactical simulations currently under devel-
opment must be closely monitored to ensure that Bradley specific skills are

covered, for both mounted and dismounted operations. If properly developed, simulations of this type can provide excellent support for the Bradley leader in the exercise of his tactical skills.

5. Since the large-scale simulations as presently designed do not cover the tactical situations and performance required of a squad leader, and only to a slight extent cover the techniques required of a platoon leader, an interactive squad or platoon level trainer should be investigated as a relatively inexpensive supplement to other trainers.

Utilization of Findings:

The BIFV Leader Trainer task analysis presented here serves three functions. First, the front end analysis is a necessary component for a formal training device requirement for a Bradley leader tactical trainer. Secondly, it provides training developers a base of tasks that must be considered for conceptualization, development, and evaluation of the large-scale combined arms simulations appropriate for the Bradley. Finally, the task analysis provides a generic listing of the set of mechanized infantry leadership tasks, and can be used as a data base for other tactical training and testing program developments.

TASK ANALYSIS OF TACTICAL LEADERSHIP SKILLS FOR BRADLEY INFANTRY FIGHTING
VEHICLE LEADERS

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INTRODUCTION

Background

The M2 Bradley Infantry Fighting Vehicle is an extremely sophisticated tactical vehicle which will carry the United States Army infantry soldier to, through, and beyond the battle in the Army 21 environment. The Bradley has been many years in development, and now that it is fielded, the Army must find the most efficient and cost-effective methods of training soldiers to use it with maximum combat effectiveness.

The problem of achieving cost-effective training has become critical because of constantly rising costs. The costs of fuel, range development and ammunition have significant impact on Bradley training. The Bradley consumes great amounts of diesel fuel due to its weight and cruising range; further, it requires many square kilometers of varied terrain for effective training in tactical maneuvers even at squad and platoon level. The major weapons systems for the Bradley, the 25mm gun and the TOW, have such long effective ranges that areas for live-fire gunnery training are difficult to obtain. Most military installations have little space available for new ranges, and construction costs are prohibitive. Finally, ammunition costs have risen considerably in the past few years, and both service and training ammunition for the Bradley 25mm gun are extremely costly.

Simulation

Because of the high costs and safety requirements inherent in training mechanized units, there has been a growing trend toward simulation in training. A state-of-the-art solution to the problem of rising costs is that of battle-field simulation through a training device. These trainers replicate (with varying degress of fidelity) the internal configurations of the vehicle, the firing of the weapons systems, and effects of firing. Computer programmed, these training devices are flexible: scenarios can be changed or repeated, and the effects of noise, malfunctions, or weather can be included to lend realism to the training situation. To the extent that these trainers replicate conditions facing the Bradley commander or gunner in a combat environment, they are of positive training benefit, and eliminate the costs associated with actual vehicle operation. The desire to reduce costs, however, does not justify the sacrifice of the ultimate goal of producing combat-ready soldiers who are fully trained in effective operation of the Bradley.

Training devices should produce effective training, measurements of performance, and a cost savings over use of the actual equipment. Therefore, in assessment of training simulators, a number of basic issues must be considered. First, a simulator must not suffer from excessive cost. Increasing complexity, while desirable from the standpoint of being able to cover a multitude of skills, tends to bring increased costs, and may diminish potential benefits.

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Additionally, the value of a training device is realized only when it is actually being used. If the device is so complicated that development and testing take many years, many iterations of training classes will be taught without its benefits. Often the need for a training device or simulator is not fully recognized until a new system has already been fielded. Since the start up time in development of an elaborate and all-encompassing device is prohibitive, this recognition often comes too late.

Finally, simulators which must be monitored by highly-trained instructors or which require the student to learn complicated rules, may have only limited usefulness. Also, a piece of equipment which is very sensitive or complex may require that the trainee spend considerable time in familiarization before beginning to receive the training benefits for which it was designed.

U-COFT. An excellent example of the type of simulator which brings the battlefield into the classroom is the computer-driven Unit Conduct of Fire Trainer (U-COFT) developed by General Electric. The U-COFT presents full color graphics to Bradley (or tank) commanders and gunners, and permits them to engage targets in a realistic manner in various scenarios. Single and multiple moving and stationary targets are presented, and the U-COFT simulates firing from both moving and stationary vehicles, using any of the available weapons systems. Performance is scored electronically in terms of accuracy of target identification and acquisition, correct selection and initialization of the appropriate weapon system, and on effective aiming and firing of the weapon. The U-COFT can be used for gunnery training at the basic, transition, sustainment, and advanced training levels.

SIMNET. Another example of a simulation approach to training is that sponsored by the Defense Advanced Research Projects Agency (DARPA), an agency chartered to advance the state-of-the-art in military technology development. This project, the Large Scale Simulation Network (SIMNET) is a long-term advanced research project, still in early stages of development. SIMNET is a combined arms land battle simulation involving approximately 300 armor and infantry vehicles and 1100 personnel positions. The initial stage of the SIMNET project focuses on the technical problems of constructing large networks of training simulators, and in producing the technology required to develop combinations of simulators separated geographically from one another. SIMNET includes force-on-force combat, leadership and command and control functions, decision-making and logistics; the battle simulation takes place within a 100 square km playing area. Each full-crew vehicle simulator within the network will consist of a microprocessor system, an image generating computer, and facsimilies of all of the controls needed for vehicle operation. SIMNET is planned to be a full tactical trainer, but prototypes will not be available until 1985, and it will not undergo full system evaluation until 1988.

Leader Trainer

The U-COFT has been shown to be successful in strengthening individual gunnery skills, including target acquisition, classification and aiming, and in development of the collective skills of crew coordination. It has only limited value in teaching the tactical skills that are needed by a Bradley Commander. The SIMNET project may produce tactical training and evaluations, but is still far from production.

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It is not yet clear, however, exactly which skills are needed for Bradley Commanders that are not needed for commanders in any other duty positions; it may be that the only Bradley-specific skills are those concerned with operation of the vehicle, and that the tactical skills are already being sufficiently taught in the advanced officer and precommand courses, in higher level NCO courses, or in the existing Bradley Commander Course. In the attempt to resolve this question, the Leader Trainer project was undertaken at the request of the United States Army Infantry School (USAIS) to determine the need for a leader trainer for the Bradley. If a trainer is needed, this project provides the background analysis and evidence which will support the submission by USAIS of a formal training device requirement, if required.

The analysis of requirements for a BIFV Leader Tactical Trainer is composed of several discrete steps. The primary goal of the analysis is to determine those tasks for which training device support is required. Then, for those tasks for which it is required, the type, characteristics, and level of training device support is specified. This analysis includes consideration of existing training devices and methods, and their adequacy in training BIFV leader tactical tasks. The present report documents the requirements and characteristics of training device support in a form and style which can be used as input for a Bradley Leader Trainer Training Device Requirement (TDR).

Basis For Methodology

The methodology used in this task analysis and related efforts is based on that outlined in the Army Research Institute Research Product 80-25, How to determine training device requirements and characteristics: A handbook for training developers (Lenzycki & Finley, 1980).

An overview of the process used in the Handbook for Training Developers is presented at Figure 1. The complexity of the process is such that it will be explicated here in general form so that the major steps of the analysis process are clear.

The Handbook for Training Developers details a comprehensive ten part approach to training analysis. This process is divided into two major categories, (1) Task Identification and Description (Steps 1.0 - 6.0), and (2) Task/Training Analysis (Steps 7.0 - 10.0). The first six steps of task identification focus on collection of operational system and performance data. During this portion of the analysis, the types of tasks characteristic of the system are identified. The compilation of tasks is developed through literature review, actual physical hands-on experience with the system, and through interviews with subject matter experts (Steps 1.0 - 1.2).

Tasks initially identified are then organized into a mission-oriented task diagram where each identified task is placed in its appropriate relationship to the other tasks in the inventory. The mission diagram divides the tasks into larger categories or mission phases (Steps 2.0 -2.3). These phases are further subdivided into smaller tasks and subtasks which detail the skills required of the system operator.

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Task Identification and Description   Task/Training Analyses

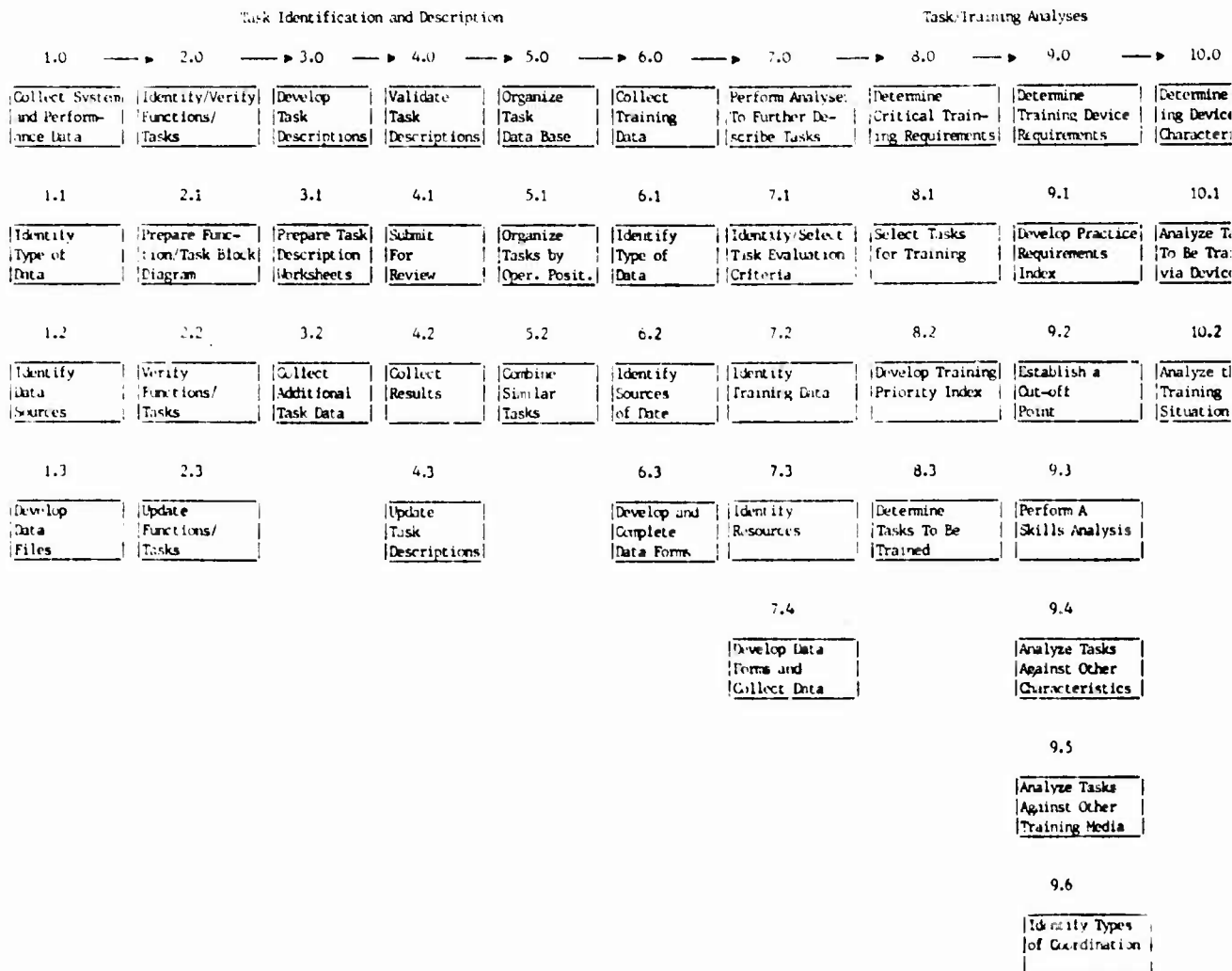| 1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
Collect System and Performance Data	Identify/Verify Functions/Tasks	Develop Task Descriptions	Validate Task Descriptions	Organize Task Data Base	Collect Training Data	Perform Analyses To Further Describe Tasks	Determine Critical Training Requirements	Determine Training Device Requirements	Determine Training Device Characteri...
1.1	**2.1**	**3.1**	**4.1**	**5.1**	**6.1**	**7.1**	**8.1**	**9.1**	**10.1**
Identify Type of Data	Prepare Function/Task Block Diagram	Prepare Task Description Worksheets	Submit For Review	Organize Tasks by Oper. Posit.	Identify Type of Data	Identify/Select Task Evaluation Criteria	Select Tasks for Training	Develop Practice Requirements Index	Analyze Ta... To Be Tra... via Device
1.2	**2.2**	**3.2**	**4.2**	**5.2**	**6.2**	**7.2**	**8.2**	**9.2**	**10.2**
Identify Data Sources	Verify Functions/Tasks	Collect Additional Task Data	Collect Results	Combine Similar Tasks	Identify Sources of Data	Identify Training Data	Develop Training Priority Index	Establish a Cut-off Point	Analyze t... Training Situation
1.3	**2.3**		**4.3**		**6.3**	**7.3**	**8.3**	**9.3**	
Develop Data Files	Update Functions/Tasks		Update Task Descriptions		Develop and Complete Data Forms	Identify Resources	Determine Tasks To Be Trained	Perform A Skills Analysis	
						7.4		**9.4**	
						Develop Data Forms and Collect Data		Analyze Tasks Against Other Characteristics	
								9.5	
								Analyze Tasks Against Other Training Media	
								9.6	
								Identify Types of Coordination	

Figure 1.   Steps in the methodology for analysis of tasks to determine
training device requirements and characteristics.

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The application of the procedures detailed in the Handbook can be roughly summarized as follows: After full identification of Bradley leader tactical tasks, the resulting task list was analyzed according to task and training implications. This step involved task ratings and input from subject matter experts (SMEs). The task list was examined to determine critical training requirements, requirements for training device support of this training, and the characteristics of these training devices.

Finally, existing and projected training devices and materials were examined for adequacy in meeting each of the identified training requirements, and recommendations were made on the identity and characteristics of devices required to support Bradley leader tactical training.

METHOD

Creation of Task List

The analysis of Bradley leader tactical tasks began with determination of the leader's tasks which require formal training, followed by analysis of those tasks which also require training device support. Since there was no readily available or comprehensive list of BIFV leadership tasks, a list of Bradley leader tasks was constructed.

The list of Bradley leader tasks was assembled from a thorough review of relevant Army field manuals and training texts, including texts for mechanized infantry and other publications which have been specifically oriented toward Bradley deployment. Various mission profiles were studied and reviewed, including the Bradley ARTEP, to insure coverage of all aspects of Bradley Fighting Vehicle tactical leadership. (See Bibliography for listing.)

The list of tasks was expanded and verified through several iterations by consultation with Army tactics experts and Bradley subject matter experts (SMEs), to insure completeness of coverage and to verify accuracy of the final task list. All types of Bradley tasks were included on this list, including many which normally would not be defined as tactical tasks. The complete list of Bradley leader tasks was included because of the interrelatedness of the tasks. Also, as is typical with implementation of a new system such as the Bradley, the potential relationships and interactions between tasks have not been sufficiently delineated to determine that any particular task or set of tasks should be immediately eliminated from consideration in a trainer.

The identified tasks were then analyzed and organized into a comprehensive data base which presented tasks in a tabular format, separating the major tasks from their sub-elements and part tasks. (See Appendix A for the entire task list.) The resulting leadership task list covers ten major mission areas: Orders, Assembly Area Activities, Pre-Combat Checks, Tactical Movement, Deploy the Dismount Team, React to Enemy Contact, React to Emergency, Offensive Operations, Defensive Operations, and Reorganization. A mission-oriented diagram was created to detail task sequencing, and to provide information on areas of overlap and potential duplication in the task list. (Figure 2 displays the mission diagram.)

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1.0 Orders	2.0 Assembly Area Activities	3.0 Pre-Combat Checks	4.0 Tactical Movement	5.0 Deploy Dismount Team	6.0 React To Enemy Contact	7.0 React To Emergency	8.0 Offensive Operations	9.0 Defensive Operations	10.0 Reorganization
1.1 Receive Mission	2.1 Establish Security	3.1 Inspect Personnel	4.1 Practice Battle Drills	5.1 Utilize Vehicle	6.1 React To Nuclear Attack	7.1 React To Fire On Vehicle	8.1 Conduct A Movement To Conduct	9.1 Occupy Defensive Positions	10.1 Prepare Personnel
1.2 Issue A Warning Order	2.2 Establish Communication	3.2 Inspect Vehicles	4.2 Supervise Terrain Driving	5.2 Utilize Personnel	6.2 React To Chemical Attack	7.2 React To Commo Failure	8.2 Cross Line Of Departure	9.2 Make Range Cards	10.2 Prepare Weapons
1.3 Make A Tentative Plan	2.3 Assign Positions	3.3 Inspect Weapons	4.3 Supervise Safe Driving Procedures	5.3 Lead Dismounted Offen/Defen Operations	6.3 React To Directed Energy Weapon Atk	7.3 React To Electrical Failure	8.3 Take Action On Contact	9.3 Coordinate Fire Support Plan	10.3 Prepare Vehicles and Equipment
1.4 Complete The Plan	2.4 Supervise PMCS	3.4 Inspect Combat Load	4.4 Maintain Security During Movement		6.4 React To Air Attack	7.4 React To ISU Failure	8.4 Attack	9.4 Coordinate Between Adjacent Positions	10.4 Submit Status Report
1.5 Issue OPORD/FRAGO	2.5 Recon Assembly Area	3.5 Supervise Precombat Operations	4.5 React To Vehicle Breakdown		6.5 React To Direct/ Indirect Fire	7.5 React To Suspension System Failure	8.5 Assault The Objective	9.5 Maintain Fire Distribution and Control	10.5 Reconstitute Defense/Prepare For Next Attack
			4.6 Breach Obstacles			7.6 React To Major Vehicular Problem	8.6 Consolidate	9.6 Conduct Retrograde Operations	
			4.7 Use Smoke			7.7 React To Weapon Malfunction			

Figure 2. Mission diagram.

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Each of the major task areas is further divided into its component tasks. For example, the major area, Pre-Combat Checks (3D on the Mission Diagram), is divided into the five sub-elements of inspection of personnel, inspection of vehicles, inspection of weapons, inspection of combat load and supervision of pre-combat operations. Then each sub-element is divided into component parts. Further subdivision of "Inspection of weapons," shows that it contains subtasks involved with inspection of the 25mm main gun, the coaxial machinegun, and the TOW. Then each of these inspections can be broken down into its component parts (e.g., clean, lubricate, dry fire, load). This process was repeated for all tasks, in all areas of mission accomplishment. It must be stressed, however, that this compendium of tasks was intended to be only a listing of task statements and does not consider task conditions and task standards. Additionally, to keep the task list from being totally unmanageable, the levels of description had to be cut off at an arbitrary level.

The general task list remains the same in form and content over all levels of Bradley leadership from Squad to Platoon, Company, and Battalion, but the emphasis within tasks, and the delineations and detailing of specific task performance, change as a function of the command level being addressed. Tasks which are of vital importance to the Bradley Squad leader (commander of a single vehicle) are not equally important to the battalion commander, although of course the battalion commander must be aware of them and their criticality to the individual squad leader. Similarly, the battalion commander's relationships with his staff and support units impact on the platoon leader, but staff functions are not part of the platoon leader task list.

Task Ratings

In accordance with the requirements of the task analysis, the lists of tasks were rated at each level by Bradley subject matter experts. The purpose of the ratings was to eliminate from further consideration those tasks which do not require extensive training or creation of a specific training device. Each task was rated on seven dimensions: 1) criticality for mission accomplishment, 2) criticality for combat survivability, 3) delay tolerance, 4) degree of new training needed, 5) performance difficulty, 6) frequency of performance under combat conditions, and 7) practice required to maintain efficiency. The rating scale used in assessment of the Bradley leader tasks was adapted from the rating scale offered in the Handbook for Training Developers, and is presented at Table 1.

The first element of the rating process, "criticality - mission accomplishment" was included to ascertain the effect of incorrect task performance on the success of the mission. A task which would have no impact on the mission if omitted or performed incorrectly was rated low on mission criticality; a task whose incorrect performance would produce a major effect on the mission was rated high. Similarly, the rating on "criticality - combat survivability," measured the extent to which incorrect performance would impact on the survival of the personnel conducting the mission. The second criticality dimension was provided because although a particular vehicle's mission might be compromised, its crew might be able to move to another vehicle and be available to perform in subsequent missions.

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Table 1

Rating Scale

CRITICALITY - MISSION ACCOMPLISHMENT

0 - Incorrect performance has no effect on mission accomplishment.
1 - Incorrect performance degrades mission slightly.
2 - Incorrect performance degrades mission significantly.
3 - Incorrect performance aborts mission.

CRITICALITY - COMBAT SURVIVABILITY

0 - Incorrect performance has no effect on combat survivability.
1 - Incorrect performance has slight effect on combat survivability.
2 - Incorrect performance has significant effect on combat survivability.
3 - Incorrect performance compromises combat survivability.

DELAY TOLERANCE

1 - Task is required but need not be initiated immediately; some delay is permitted.
2 - Task must be initiated immediately upon receipt on information that task is required.

DEGREE OF NEW TRAINING

0 - Task can be performed by personnel as a result of prior training.
1 - Task can be performed after brief on-the-job familiarization.
2 - Task will require a relatively restricted amount of specialized formal training.
3 - Task performance will require acquisition of new knowledges, skills, and specialized training.

TASK PERFORMANCE DIFFICULTY

0 - Unskilled task, no training required.
1 - Easy to perform in the operational situation.
2 - Fairly hard to perform; some constraints in the operational environment in which task is performed.
3 - Hard to perform.

TASK FREQUENCY UNDER COMBAT CONDITIONS

0 - Rarely performed; only as need arises; e.g., emergency or contingency.
1 - Monthly - one to four times a month.
2 - Weekly - one or more times a week.
3 - Daily - once a day.
4 - More often than once a day.

PRACTICE REQUIRED TO MAINTAIN PROFICIENCY

0 - No practice required.
1 - Monthly
2 - Weekly - one or more times a week.
3 - Daily - once a day.

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Another dimension rated was "delay tolerance." Some tactical tasks must be performed immediately; for others delay time is available, and this opportunity for time flexibility becomes important in training considerations. Thus, tasks were rated on the amount of time perceived to be allowable between knowledge of the combat "cues" to perform the task and initiation of the task.

The tasks were also rated on "newness of training," i.e., the extent to which the individual performing the task requires the acquisition of new knowledges and skills and specialized training before adequate performance is possible. Tasks that can be performed by personnel as a result of prior training or after a brief on-the-job familiarization are rated lower in terms of training device need than are those requiring specialized formal training.

Another rating dimension focused on task "performance difficulty." Unskilled tasks, or those relatively easy to perform are rated lower than those which are somewhat difficult or very hard to perform in the operational environment.

"Task frequency under combat conditions" measures the likelihood of the individual having to perform the task at all. Frequency ranges from continuous, ongoing tasks, to those tasks which would be performed only rarely in a combat environment. A category was included for emergency tasks, to provide a place for those tasks which are never performed except in an emergency situation. As will be discussed later, this category produced difficulties in the rating process.

The final rating required an estimation of the amount of practice required for individuals to maintain proficiency in performance of a given task. Ratings range from daily practice, through weekly and monthly repetitions, to tasks requiring no practice.

In summary, each task was rated on seven dimensions: (1) criticality for mission accomplishment, (2) criticality for combat survivability, (3) delay tolerance, (4) degree of new training needed, (5) performance difficulty, (6) frequency under combat conditions, and (7) practice required to maintain combat efficiency.

Other Analysis Dimensions

Specific behavior categories represented by each of the Bradley leader tasks were analyzed and task performance was studied to see which categories were represented. These behaviors included procedure-following, continuous perceptual/motor acts, decision-making, visual discrimination, and communication. According to the Handbook for Training Developers, procedure-following is defined as learning to carry out a series of discrete perceptual/motor acts in a fixed sequence. Continuous perceptual/motor acts involve variable procedures where an action may be dependent on the results of other actions. Decision-making involves choosing a course of action on the basis of facts, pre-established standards or criteria, prior experience, opinions or other information relevant to the decision. Visual discrimination consists of observing a display or portion of the environment either continuously or by

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order to detect a specified kind of change. Communication skills are receiving and/or sending information either verbally or by some other kinds of symbols.

Each task was also analyzed as to whether it involved a physical coordination with another operator, or whether the task interaction was of a communicational nature. Tasks categorized as involving physical coordination require actual physical teamwork; communication tasks occur when the output of one operator serves as the input needed by another in order to perform the required task. This communication can be verbal or signalled, and can be with one or two persons, or can be directed to a group. Communication can be with persons within the vehicle, with persons in other vehicles, and can be accomplished face-to-face or by radio communication. Tasks requiring physical coordination would include all aspects of turret operation and gun lay, where a Bradley commander actually operates his hand controls. Inspection procedures where the commander must visually inspect weapons or vehicles would also be considered physical coordination. Some tasks can be considered to encompass both types of coordination and are so rated.

Finally, conditions affecting task performance were noted. A number of possible conditions listed in the Handbook for Training Developers were analyzed for their impact on Bradley leaders. The initial list consisted of eleven factors which might impact on task performance: restricted visibility, noise, moving vehicle, temperature/humidity, extreme weather, type of terrain, multiple targets, high communication load, workspace restrictions, personal equipment and clothing, and contact with the enemy.

Of these conditions, five were considered to be most important in Bradley employment, and most likely to have an adverse influence on correct task performance. These conditions are: 1) weather (to include temperature and extremes of precipitation), 2) limited visibility (darkness, fog, smoke, limitations of periscopes and sights), 3) noise (both internal and external to the vehicle), 4) high communication load and/or communication system failure, and 5) enemy contact. A category not listed in the Handbook, the effect of sustained operations, was added for this project. Each of the tasks was analyzed for the extent to which performance would be affected by one or more of these factors.

The training site for each one of the tasks was noted and for those in which training occurs in more than one location, secondary sites were noted. Since the Bradley is still a relatively new system, the primary training site for many Bradley personnel is the Fort Benning Infantry School setting. At Fort Benning, the driver-related Skill Level 1 tasks are taught to soldiers at the end of their Infantry One Station Unit Training (OSUT) in a three week add-on course for the Bradley 11M MOS Fighting Vehicle Infantrymen. Commanders, gunners, and master gunners for the BIFV are taught by personnel from the 1st Bn, 29th Infantry Regiment at Fort Benning. Graduates are assigned to or are returned to Bradley-equipped units. An additional training resource for Bradley units is the Infantry School's New Equipment Training Team (NETT). A final training site is the unit, where some individuals who have been assigned to Bradley units without having had prior Bradley training learn Bradley skills through on-the-job training.

The methodologies used in obtaining the task ratings and the results of the ratings at the squad leader, platoon leader, and company commander level are presented in the following sections.

SQUAD LEADER TASK RATINGS

On two successive days, NCOs, either E6 or E7, met in a conference room setting to rate the task list from the standpoint of a Bradley Infantry Fighting Vehicle Squad Leader. The NCOs were all Bradley experienced, and were involved in duty positions characterized by some form of Bradley-related activity. Two of the raters were members of Delta Company, 1st Bn, 29th Infantry Regiment, which is the Fort Benning Infantry School support unit. Both men have had extensive experience in Bradley employment, and have occupied all duty positions within the vehicle. Two other raters were from the Fort Benning Infantry Training Group, which trained entry level soldiers in Bradley skills. The two, senior NCOs, were also graduates of the Commander's Course offered by USAIS, and have therefore a wide breadth of experience. Another rater, from the Infantry School's Directorate of Training and Doctrine, was a member of the original Fort Benning Bradley Task Force, and is an acknowledged Bradley Subject Matter Expert (SME). The final member of the group, from the Weapons Gunnery and Maintenance Department, had just returned from assignment to the BFV NET Team at Fort Hood, and has been involved in all phases of Bradley training and duties.

The purpose of the assessment was explained to the SMEs, and they were told that they were to rate the Bradley leader tasks on a number of dimensions. Their ratings would be group ratings, reached after a discussion to achieve consensus, and were to be made for persons holding the duty position of squad leader in a Bradley. They were encouraged to discuss tasks at the platoon leader/platoon sergeant level if they so desired but were told that their primary task was to rate the tasks at squad level.

The task list was duplicated so that each rater had his own list; the raters were given some time to look over the list. Each man was also given a copy of the rating scale which contained the dimensions on which each task was to be rated. They were given time to read through the list of dimensions to be rated, and to become familiar with the rating procedures. An opportunity for questions was given at this time.

The rating process began with oral reading of the first task. The men were first asked to rate it on mission criticality. When they had arrived at a consensus, the results were recorded on a master sheet. Similarly, the same task was rated on all of the other dimensions. After one task had been completely rated, the next task was read aloud, and the process was repeated. Approximately one half of the task list was rated on the first day; the final half was rated on the second day. After an initially slow start, the ratings proceeded rather quickly, and for the most part, very smoothly. There were very few instances where members of the rating staff disagreed with each other on the rating to be given to a particular task; in those instances, brief discussion brought resolution of the problem.

The men were reminded to try to perform the ratings based on squad leader training requirements, and to respond to the task in general, without trying to be too specific. Since there was no way the task list could encompass every possible scenario and combination of tasks, the tasks were written for general conditions, without detailing the tasks which change with specific missions.

Results

Training Requirement Priority Index

The data derived from the task ratings for the squad leader level of leadership were analyzed according to the procedures developed in the Handbook for Training Developers. First, any task which received a zero (0) rating on criticality or newness or performance difficulty was marked to be eliminated from further consideration for a training device requirement. The rationale for this elimination of tasks was that if a task is not critical, incorrect performance is of little importance, and a training device is not justified. Similarly, if the task is not new, or is not difficult to perform, it does not warrant a training device. However, very few tasks scored zero on any of the dimensions, and accordingly, this measure was retained only for information; no useful purpose would be gained by eliminating any tasks from the list on that basis since so few fell in that category. Too, this precluded falsely eliminating any task on an arbitrary basis.

Next, as specified in the Training Developers Handbook, a Training Requirement Priority Index (TRPI) was calculated for each task. This figure was obtained by multiplying the numerical rating for criticality for each task by the numerical ratings for newness and performance frequency (i.e., TRPI = Criticality x Newness x Performance Frequency). Since there were two ratings dealing with criticality (mission accomplishment and survivability) the higher of the two ratings was taken, if there was a difference between the two. The purpose of the TRPI is to provide a process for determining training requirements. A task which is interpreted as being very critical for mission accomplishment, scoring high on newness and performance difficulty, is more in need of training device support than a task which is not perceived as critical, or one which although critical, is neither new nor difficult to perform.

In the initial analysis of data, it became apparent that a deficiency inherent in the rating scale on performance frequency was unduly influencing the results and was giving an untrue picture of the task priority ratings. The rating scale for frequency of performance under combat conditions included a possible scale value of zero, which was designed to be used for tasks which are performed only on an emergency or contingency basis. Such tasks as "extinguish a fire," or "rescue a mired vehicle" would be examples of such tasks.

The raters somewhat arbitrarily decided that many of the tasks generally performed in combat fall into this category, and are performed only when needed. They maintained, for example, that the task "react to indirect fire" happens only on a contingency basis; it does not happen on a planned or foreseeable schedule, and thus, it is performed only when indirect fire occurs, as a result of that fire. Although this interpretation was clearly not what the scale intended to convey, for a number of reasons the raters were permitted to continue to use the 0 category ("rarely performed, only as need arises; e.g., emergency or contingency") for this dimension, even when it became evident that most of the tasks actually performed under combat conditions would then have a TRPI score of zero.

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First, to have challenged their assumptions about ratings midway through the proceedings would have taken the researcher out of the role of moderator, and might have influenced the rating process in an undesirable manner. Also, the attitude of cooperation and professionalism among the raters was so strong that to have rejected their interpretation would probably have destroyed the established rapport.

In the final analysis of the results, therefore, the tasks which were not truly emergency tasks but which were assigned a zero value for combat performance (rarely performed; only as need arises; e.g., emergency or contingency) were arbitrarily assigned a value of 2 (weekly - one or more times a week). In the combat situation, these tasks, which involve weapon deployment and reactions to enemy contact would occur more often than once a week, but a conservative approach was taken. (The next scale value, 3, daily - once a day, was interpreted as too far from the raters' intent.)

The final TRPIs were rank ordered, with the task having the highest TRPI rated number one. The highest TRPI for the squad leader list of 72 tasks reached the maximum possible TRPI value of 36, for the group of tasks in tactical movement focusing on supervision of terrain driving, safe driving, and maintaining security during movement. The lowest TRPI value was 1, for the two tasks of establishment of an SOP for reporting, and dealing with malfunctions in a firing port weapon. The mean TRPI was 11.96, with a median of 9, and the bimodal values of 6 and 18 were the most frequent TRPIs of the 72 tasks.

Practice Requirement Index

In addition to the TRPI, a Practice Requirement Index (PRI) was calculated. This index was determined by multiplying the ratings for practice needed by the ratings for performance difficulty and delay tolerance (i.e., PRI = Practice x Performance Difficulty x Delay Tolerance). The rationale for this index as it appears in the Handbook for Training Developers was based on the likelihood that practice needs would be greater for tasks which are very difficult, and or which must be performed quickly. The PRIs ranged from the maximum value of 18 for the tasks involved with supervision of terrain driving and maintaining security during movement to a low of 1, shared by 11 tasks. The mean PRI was 3.63, and both median and mode were 2. The Squad Leader task list, with TRPI and PRI values for each task, is presented at Appendix B.

A cutoff score of 12 for the TRPI and one of 8 for the PRI is suggested by the Handbook for Training Developers, to eliminate some of the less critical tasks from further consideration. Since some of the analysis parameters did not fit the Bradley task rating very well, and since the total number of tasks was not very large, a conservative approach was used and both the TRPI and PRI cutoff scores were set at a lower level than suggested. Accordingly, cutoff points were established at 6 for the TRPI and at 3 for the PRI. The TRPI was the main determiner; tasks that passed the TRPI cutoff were then assessed on the PRI index and only tasks then exceeding both cut off scores were retained. A rank-ordered list of the 32 tasks which exceeded both cutoff scores is presented at Table 2. (BIFV Soldier's Manual numbers roughly corresponding to some of these tasks are presented at Table 3 and other information contained in Table 2 will be discussed in the following section.)

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Table 2

Squad Leader Ratings

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
Supervise terrain driving	36	18	X	X	X	X	X	X	X	X	X	X	X
Security during movement	36	18		X	X	X	X	X	X	X	X	X	X
Supervise safe driving	36	12	X	X	X	X	X	X	X	X	X	X	X
Assign posns. assembly area	27	12		X	X	X	X	X	X		X		X
Supervise PMCS veh & weapons	27	6	X	X	X	X	X	X	X				X
Precombat inspection - vehicles	27	4	X	X	X	X	X	X	X				X
Precombat inspection - weapons	27	4	X	X	X	X	X	X	X				X
Reorg. prepare weapons	24	4	X	X	X	X	X	X	X				X
Use fire commands	18	8	X		X	X	X	X		X	X	X	X
Recon assembly area	18	4		X	X	X	X	X	X				X
Defense-fire dist. & control	18	4		X	X	X	X	X	X	X	X	X	X
Attack	18	4			X	X	X	X	X	X	X	X	X
Reach objective	18	4			X	X	X	X	X	X	X	X	X
Consolidation	18	4			X	X	X	X	X	X	X	X	X
Distributed/concentrated fire	18	4		X	X	X	X	X	X	X	X	X	X
React to chemical threat	12	6	X		X		X	X	X	X	X	X	X
Vehicle position-dismount	12	4		X	X	X	X	X	X	X	X	X	X
Establish SOP exit	12	4	X		X		X				X	X	
React to air attack	12	4		X	X	X	X	X	X	X	X	X	X
Suppress ATGM	12	4		X	X	X	X	X	X	X	X	X	X
Establish security, defense	12	4			X	X	X	X	X	X	X	X	X
Weapon malf. 25mm	9	8	X	X	X		X	X	X	X		X	X
React to emergency, ISU limvis	9	6	X	X	X		X	X	X			X	X

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Table 2

Squad Leader Ratings (continued)

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
React to emergency, elect. fail.	9	3	X	X	X		X	X	X		X	X	X
Estab. assembly area security	8	4			X	X	X	X	X	X	X		X
Use effective range weapons	6	8			X	X	X	X	X		X	X	X
React to emergency, ISU day	6	6	X	X	X		X	X	X			X	X
Maintain MOPP	6	4	X		X		X		X			X	X
Exit and remount dismount	6	4			X	X	X	X	X	X	X	X	X
React to nuclear threat	6	4				X	X	X	X		X	X	X
React to emergency, susp. system	6	4	X	X	X		X	X	X			X	X
Make a plan	6	4			X	X	X	X	X	X	X	X	

Table 3

Squad Leader Tasks and Soldier's Manual Numbers

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Task Name	Soldier's Manual Number(s)
Supervise terrain driving	071-324-6001, 071-326-5915
Security during movement	071-326-3055, 071-326-5915
Supervise safe driving	071-324-6001, 071-324-6019, 071-324-6033
Assign assembly area position	
Supervise PMCS veh/wpns	071-313-4001, 071-314-0003, 071-330-3009, 071-324-1008, 071-311-6001
Precombat inspection - vehicles	071-330-3009, 071-324-1008, 071-326-3057
Precombat inspection - weapons	071-313-4003, 071-314-0002, 071-314-0006, 071-324-4002, 071-316-3009, 071-314-0008, 071-313-4004, 071-316-3005, 071-311-6001, 071-311-6002
Reorganization, prepare weapons	071-326-5914
Use fire commands	071-314-0017
Recon assembly area	
Defense, fire distribution & control	071-326-5905, 071-326-5908 071-326-3054
Attack	071-326-5911, 071-326-5912, 071-326-5915, 071-326-5917
Reach objective	071-326-3060, 071-326-5914
Consolidation	071-326-3060, 071-326-5914
Distributed/concentrated fire	071-326-5912, 071-326-5905
React to chemical threat	
Vehicle position - dismount	071-326-3056, 071-326-5910, 071-326-5918
Establish SOP exit	071-326-3056, 071-326-5910
React to air attack	071-326-5913
Suppress ATGM	071-326-3012
Establish security, defense	071-326-3055, 071-326-5907
React to weapon malfunction, 25mm	071-314-0011
React to emergency, ISU limvis	
React to emergency, electrical	
Establish assembly security	071-326-3055
Use effective range weapons	071-326-5905, 071-326-5912
React to emergency, ISU day	
Maintain MOPP	
Exit & remount dismount	071-326-3056
React to nuclear threat	
React to emergency, suspension	
OPORD/make a plan	

Interactive Skills Analysis

For those tasks which exceeded the TRPI and the PRI cutoff point further analysis was performed by the researcher. First, the interactive skills of the task were described, to determine whether the commander performed the tasks alone or in conjunction or coordination with other persons, either within the vehicle or with an individual in another vehicle.

For most of the tasks represented by the squad leader's task list, a primary person for interaction and communication can be specified. In most cases, the interactive person is either the gunner or the driver, or one in sequence with the other. Interactions with the rest of the crew members are frequently more in the form of information sharing; the leader must keep the dismount team aware of the situation as it affects them, although they may not have any specific tasks to do in relation to the situation. The Bradley commander's communication may also include radio commo with adjacent or higher units, particularly with the platoon leader or platoon sergeant's vehicles. For most tasks, however, the leader is in communication with a number of persons in sequence. For the 32 tasks on the squad leader list, only the driving supervision tasks can be said to involve the vehicle commander and only one other individual. Any of the items representing malfunctions with the weapons involve major amounts of interaction with the gunner, and with the driver who must be ready to be directed to a hide position. However, the dismount team also must be alerted to the problem in the event that they will be required to dismount to continue operations or to provide security at a halt.

Behavioral Skills Analysis

Next, the kinds of behavior skills represented in task performance were described, using the five categories of: 1) procedure following, 2) continuous perceptual motor acts, 3) decision-making, 4) visual discrimination, and 5) communication (see Table 2). Preliminary inspection showed that each of the 32 tasks fit into more than one of the categories, and five of the tasks, "supervision of terrain driving," "supervision of safe driving," "inspection of vehicles in the assembly area," "inspection of weapons in the assembly area," and "supervise PMCS vehicles and weapons" scored in all five behavioral categories.

Fifteen of the 32 tasks are judged to involve some aspects of procedure following, where a series of discrete motor steps are performed. (Refer to Table 2 for specific tasks.) Nineteen tasks involve perceptual motor skills, with specific actions being dependent on the outcome of other actions, and 23 require some visual discrimination, either in scanning, or in the close attention required in acts of inspection. The skills represented by these three categories tend to focus on the BIFV operational tasks, where the squad leader actually physically interacts with the vehicle, and where there are some aspects of hands-on performance in the task.

All 32 of the squad leaders' main tasks involve decision-making, and all 32 also involve some aspects of communication. This finding is indicative of the fact that the Bradley squad leader's tasks represent a fairly complex

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level of behavior. Most useful is the observation, then, that a number of different kinds of responses are required of the Bradley leader, and that many of them represent combinations of several kinds of skills.

Each task was also assessed as to whether it involved a physical coordination with another operator, or whether the task interaction was communicational. As is evident from the preceding description, although some tasks represent a physical coordination, all tasks represent some form of interactive communication, either verbal or by some signal. The tasks involving physical coordination cover all aspects of turret operation and gun lay where the commander actually operates his controls in his interaction with the gunner in preparation to fire. Inspection procedures also involve a physical coordination, as do the activities involved in performing reconnaissance of an area.

However, for these and all the other tasks, interpersonal communications play a part. For example, in the case of inspections, the commander must at the minimum convey his approval or disapproval to the remainder of the crew. In the case of tasks involving emergencies, such as 25mm gun misfire, although the leader might himself not be the one who is involved in the hands-on correction of the problem, he must inform the driver and crew of the situation, and if the problem appeared to be of long duration, he would probably also inform his superior by means of the radio. Also, if the vehicle had to be moved to a safe location for a period of time, the commander might have to alert the dismount team to provide dismounted security at the halt. Each of the other tasks can similarly be interpreted as being based on communicative interactions.

Conditions Affecting Performance Analysis

Finally, conditions affecting task performance were noted. (See Table 2.) A number of possible conditions listed in the Handbook for Training Developers were studied for their applicability to Bradley leader tasks. As is to be expected, each task performed by a BIFV squad leader is susceptible to deterioration or degradation of performance as a function of many conditions. Furthermore, these distractors tend to interact, and not to occur in isolation, thereby tending to multiply their effects. Those tasks least effected by external events are the activities performed in the assembly area, as although there is a potential for enemy contact, it is not likely, and there is more time latitude available. Although each of the eleven performance degraders (see Table 4) mentioned in the Handbook for Training Developers impacts in some measure on Bradley squad leader performance, the five areas mentioned marked by asterisk seem to be most relevant to the BIFV.

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Table 4

Conditions Affecting Performance

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* o   Restricted visibility (periscope and sight limitations, darkness, fog, smoke)

* o   Noise (internal and external to vehicle)

  o   Moving vehicle (acceleration, deceleration, rough terrain)

  o   Temperature/humidity extremes (hot, cold, humid, dry)

* o   Extreme weather (snow, rain, sleet)

  o   Type of terrain (desert, mountain, built-up)

  o   Multiple targets

* o   High communication load

  o   Workspace restrictions (control and equipment access, crowding)

  o   Personal equipment and clothing (gloves, helmets, masks)

* o   In contact with enemy

One of the distractors or conditions which is judged to have an adverse effect on BIFV squad leader task performance is noise level, both internal noise and that external to the vehicle. Noise of gunfire, from the vehicle guns as well as from external opposing or friendly fire, the constant noise of the engine, and the sound of the vehicle's movement can have a cumulative effect. Where there is a need for verbal communication, either in person or on the radio, a high noise level can make task performance very difficult and sometimes impossible. Noise level also may include the requirement for silence, which in many situations may make job performance more difficult. Of the 32 tasks passing the squad leader TRPI and PRI cutoff scores, 19 can be affected by noise (refer to Table 2).

A high commo load is another factor which can degrade squad leader performance. The necessity of communicating with the driver, gunner, and crew while simultaneously monitoring the platoon net or communicating with other vehicles while performing other tasks, puts a great burden on the squad leader. Many tasks are of a communicative nature to begin with, e.g., "supervise terrain driving," and a great deal of information to be communicated at one time makes the job harder. Finally, performance of other tasks may be degraded because the leader's attention is distracted from them by the constant demands of the radio. Of the 32 squad leader tasks, 21 could show performance degradation as a function of a high commo load. The only task areas relatively unaffected are assembly area inspections and supervisions, and those tasks dealing with weapon or vehicle malfunction. However, it could be argued that a high commo load would affect these activities as well.

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Enemy contact brings potential for performance degradation to all tasks. In addition to the obvious effects of fear and stress produced by combat, actions take on an added urgency, and penalty for error increases. Vehicle movement increases and there is greater need for communication with the driver. The only tasks failing to score in this category are those concerned with activities in an assembly area where there is no enemy contact.

Another condition affecting the squad leader's performance of his activities is limited visibility, including night and daytime degraded visibility produced by weather conditions or the effects of smoke. In night operations, the problems of dark adaptation, and maintenance of night vision are coupled with problems in use of night vision devices which may be unavailable or inoperable. Range estimation and target identification are more difficult in limited visibility, even with the sophisticated thermal sight of the BIFV. Only the tasks "SOP for dismount exit" and "supervision of MOPP" can be considered relatively unaffected by limited visibility.

Inclement weather also affects performance. A task may not be performed as well because of the difficulty of doing it in rain or snow, or it may be performed with diminished accuracy as speed in finishing becomes important to the physical comfort of the operator. In situations where the occupants of a vehicle must wear MOPP gear and remain "buttoned up" with all hatches closed, summer heat can have an adverse impact. Similarly, extreme cold slows the start-up time of the vehicle and can affect the leader's planning. Within-vehicle cold also affects job performance as although all BIFVs have heaters, operation is unpredictable, and heat is unevenly distributed within the vehicle. Only the task areas "SOP for dismount" and "issue fire commands" appear not directly affected by weather.

Although not mentioned in the Handbook for Traning Developers, a final area judged to impact on job performance is sustained operations. Bradleys can and will be operational for long periods of time, and job performance may suffer accordingly. Needs for a regular sleep/rest cycle will be critical for all personnel, especially the commander. Fatigue contributes to degradation of performance, in terms of both efficiency and safety for personnel and vehicles. On the squad leader task list, only establishment of an SOP for exiting the dismount team fails to be affected by sustained operations, presumably because, by definition, an SOP is standard and will not vary. However, sustained operations may affect the ability to follow the SOP, and to that extent, may have impact.

Summary of Analyses

Table 5 presents, in summary form, a recapitulation of the elements of analysis used on the Bradley Infantry Fighting Vehicle Squad Leader Tasks.

Table 5

Elements of Analysis

After tasks were rated by SMEs, data was analyzed in the following manner:

1. Any task which scored zero (0) on criticality, newness, or performance difficulty was eliminated from further consideration.

2. For the remaining tasks, a Training Requirement Priority Index (TRPI) was calculated by multiplying the ratings for criticality by newness and performance frequency.

3. For the same tasks, a Practice Requirement Index (PRI) was calculated by multiplying the ratings for practice needed by performance difficulty and delay tolerance.

4. TRPI and PRI cutoffs were established to define the critical task list.

5. A behavioral skills requirements analysis was conducted to identify the skill requirements of each of the operator tasks or task steps.

6. A coordination requirements analysis was performed to identify whether tasks were performed individually or interactively, and whether coordination was of a physical or a communicational nature.

7. An analysis of conditions affecting task performance was performed to determine those conditions that impinge on an operator's sensory, mental, or motor processes so as to increase the difficulty of performing some or all of the task steps required in the task.

Discussion

The discussion which follows is based on many factors which complement the squad leader ratings. During the rating process, the SMEs made a number of comments about the Bradley and their experiences with it that were not directly related to the rating effort at hand. These comments were noted, and specific points were addressed later in informal discussions. Additionally, a large number of BIFV classes were attended and instructors and students were questioned regarding training and the use of the Bradley in a combat situation. Several officers experienced in both the Bradley and in small unit tactics were consulted, and senior NCOs were interviewed in-depth and individually for their impressions and experiences about the Bradley. Points emerging in the squad leader rating process were discussed with both the commissioned and noncommissioned officers, and help form a basis for this discussion as it relates to the squad leader ratings.

The 32 tasks which exceeded the cutoff scores for the TRPI and the PRI can be grouped into several categories, and each grouping will be discussed separately. Generally, the results are somewhat as expected. For the squad leaders, the complexity presented by the Bradley's multiple weapon systems caused high ratings for the tasks involving determination of which weapons to fire under particular circumstances. The increased responsibilities presented by the presence of a dismount team whose safety must be insured caused high scores in the areas relating to the dismount team, although the activities of the dismount team were seen as neither new nor difficult. All aspects of safety, with respect to the vehicle, the weapons, and personnel, were stressed, with particular focus on the importance of the Bradley commander maintaining communication with his own vehicle driver at all times. The activities involved in a combat mission, (i.e, the elements of attack and defense), were assessed as being somewhat more difficult with the Bradley than with other vehicles, but since the actual tasks and performances are very similar, the differences were not interpreted as too important from the squad leader's standpoint. Too, the squad leader's perceived lack of opportunity for initiative (due to his relatively low level of command) during a mission affected the ratings on these tasks.

The ratings are presented in Appendix B and highlights will be discussed. For this group of squad leader raters, the task category scoring highest on the measures of a need for a training device is that set of tasks involved in supervision of movement of the vehicle. The tasks of insuring safe driving procedures and insuring effective terrain driving, and maintaining security during movement were interpreted as the most difficult tasks presented to a squad leader. Included as sub-elements of terrain driving were navigation part tasks such as planning, route selection, evaluation of trafficability, and bridge/water crossings. Safe driving included order and speed of movement, vehicular intervals, formations, positions, and signals. Security during movement involved the subtasks of 360 degree observation, turret orientation and weapon posture, assignment of target priorities, maintenance of air guard, and use of blackout procedures.

This concern about vehicle movement was emphasized as the raters many times expressed concern over the squad leader's frequent inability to communicate effectively with the driver of his vehicle. They noted that often the intercom and radios are not functioning adequately, and the commander's

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failure to make the driver aware of his needs in a timely fashion could present potentially serious problems. Each of the men felt that the Bradley presents a unique and difficult control problem between the driver and the track commander, a problem which the squad leader perceives as being very high on a training priority list. For the squad leader whose primary area of concern is his own vehicle and the personnel inside it, safety during movement is paramount.

Another area of concern for the squad leader is covered in the category of assembly area activites. The squad leaders felt that they had a great deal of control over maintenance of their own vehicles and would therefore have major responsibilities for making their own vehicles combat-ready. The complexities and sheer numbers of tasks represented by the Bradley created high ratings for many of the tasks performed in the assembly area. Selection of assembly area positions, recon of the area, and security in the assembly area scored high, perhaps because of the enormity of the other tasks to be done, and the difficulty of getting everything done at once. Some concern was also expressed about the likelihood of a commander having a full crew at his disposal, thereby increasing the task load for those who were present.

Inspections of vehicles and weapons were critical tasks for the squad leaders; each rater felt very strongly that starting a mission with the vehicle and its weapon system in maximally good condition was of major importance. They stressed the need for preventive maintenance checks and services (PMCS), and for making sure that every piece of equipment was available and ready for use at all times, and in every possible mission phase. The squad leaders were thoroughly aware of the complexities of the weapons systems on board the Bradley, and the necessity for keeping both the mounted and dismounted weapons operating.

Another task area which scored relatively high for the squad leader raters was that portion of the order giving sequence which involved making a plan. The squad leaders felt that as individual vehicle leaders they had little influence on mission planning as a whole, but would have some decisions to be made about their own vehicles. The planning for their own vehicle represented the only area in which they felt that a squad leader would have much to do, in relation to the platoon order, and they perceived this as being an important part of their overall mission.

The presence of an available dismount team is one of the significant features of the Bradley, and the squad leader raters considered it an item of importance. They were not concerned with employment of the team in the dismounted mode, as they considered those activities to be very similar to all infantry fire and maneuver techniques and not specific to the Bradley. The issues of SOP for exit and for remount of the dismount team, and all the details covered in those tasks were important, as was addressing the necessity for the vehicle team to provide covering fire for the dismount team. The squad leaders noted that these tasks are not intrinsically difficult, but merely seem so because of their newness.

Emergency conditions on the vehicle and with the weapon system provided a few tasks which the raters considered important. Reactions to electrical failure and the necessity of transferring to the manual mode, and therefore to

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make large numbers of adjustments at once, was seen as a difficult task or group of tasks to learn. This difficulty appears to be a function of the volume of details to be dealt with. Failure of the integrated sight unit (ISU), in the day and especially during periods of limited visibility, is also a problem. The backup sight is not complicated to use, but the leaders felt that their performance would deteriorate without the ISU, and they felt that a squad leader should be aware of the best ways of coping with its absence. The failure of the suspension system was interpreted as potentially life-threatening if the vehicle is incapable of movement; the need to find solutions quickly, or to make the decision to remove the dismount team to another vehicle was seen as a major problem.

The only weapon failure that represented great concern to these raters was 25mm gun failure. While other weapons system failures were considered to be a problem requiring attention, they considered the 25mm to be the main gun, and without it the raters, as squad leaders, feel unprotected. The necessity for making repairs or troubleshooting, and for dealing with main gun failure instantly, is considered to be one of the larger problems the individual squad leader faces.

During a mission, several aspects of dealing with the weapons systems of the Bradley become important for the squad leader. Fire control, and decisions about concentrated versus distributed fire are seen as difficult. The speed with which a vehicle can expend its ammunition when firing at a high rate concerns the leaders, and they are aware of the need for constant monitoring of ammunition. They admit to being still unfamiliar with the idea of having so much firepower available and feel that learning to use the effective range of the weapons presents a large problem. The fire commands themselves require a great deal of practice, partly because of the many choices available to the commander and gunner, and because of the possible speed with which decisions must be made.

The actual activites of offensive operations and reaching an objective, and tasks involved in consolidation or defensive security are rated relatively high because of the complexity of the activities demanded of a squad leader during the performance of these tasks but the difficulties are not Bradley-specific. The squad leader is responsible to the platoon leader, and also for his own vehicle and the men inside. All activities are difficult because of so much responsibility, and so large and complex a vehicle from which to operate.

Some other areas which were rated high by the raters are rated high in any system, and cannot be considered Bradley-specific. For example, the raters cited evasion of an anti-tank guided missile (ATGM) and activities involved in preparation for nuclear or chemical defense as difficult but agreed that the Bradley did not make the tasks any harder. It merely provided additional tasks. The physical constraints of the Bradley make operation in MOPP gear difficult, but little more so than in any other situation. Air defense and engagement of aircraft and low flying helicopters are also difficult tasks, although not frequently performed.

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Conclusions

The results of the analysis of the squad leader ratings of tasks performed by the commander of a Bradley Fighting Vehicle indicate that for a BIFV squad leader the most critical tasks in terms of training need can be grouped into three general categories: (1) mechanical or operator tasks, (2) supervision of movement, and (3) use of firepower.

Operator Tasks

The Bradley squad leaders feel that leadership in the Bradley is difficult in many of the task areas that reflect the mechanical complexity within the vehicle, or tasks that occur as a result of these configurations. Some of the highest rated tasks which prove most difficult to do or to supervise are those performed in the assembly area. These tasks, involving inspections of vehicles, weapons, and personnel, are critical, although they are not generally considered to be part of tactical training.

Other operator tasks that are rated high are those involved in dealing with malfunctions and system failure. Equipment failure is an inevitable part of any system over time; the major problem presented in dealing with such failures is the inconvenience rather than newness or complexity. These equipment related problems will not resolve themselves over time, and training in dealing with them needs to receive high priority. Again, these tasks are not tactical tasks, but they impact on performance of other tasks.

Supervision of Movement

The tasks involved in control and supervision of the driver are not unique to the Bradley, but these are problems which are increased by the physical distance from the commander to the driver in this vehicle, and by the mutual dependence on the intercom. The greater the practice time available for a commander and his driver, and the more time they spend in performing the various interactive tasks, the greater the likelihood that tasks will be performed well in a tactical situation regardless of conditions.

Use of Fire Power

Another task area receiving high ratings from squad leaders is the area focusing on firepower and the effective range of the weapons. Part of the perception of difficulty may be due to the newness of the vehicle, and the relatively low number of individuals who are thoroughly experienced with it and its capabilties. When crews have had more experience with the Bradley they will be more used to its capabilities for specific situations, and will feel more comfortable with the potentials of the weapon system. Since this is such a great part of tactical employment of the Bradley, however, training must be appropriate to the present standard of experience.

Recommendations

The major areas of training needing reinforcement at the squad leader level appear to be those which focus on the interaction of different activities, rather than on any one set of tasks alone. No single task area per se is extremely difficult; rather, it is the likelihood of having to do several tasks at one time that creates potential difficulty, and it is this interaction of tasks and operators that requires a great deal of practice. For the squad leader, his own activities in gunnery and vehicle command are potentially difficult only in relationship to the other activities also required of him; any training devices should probably attempt to replicate as many of the interactions of tasks and operating conditions as possible.

Part task trainers and a number of gunnery training devices for the Bradley are already available, and appear to be able to train the specific tasks required. (A list of some training devices and their applicability to Bradley tasks is presented in Appendix C.) What is most needed at the squad level is something which provides the leader with the opportunity to make a large number of decisions in a very short period of time, under conditions similar to those he might experience in combat.

The squad leader is concerned primarily with his own vehicle, and views activities from the perspective of an individual who is inside of one Bradley. Gunnery skills can be trained by many potential training devices; the leadership qualities and the abilities to make decisions rapidly are those which are more difficult to train. To some extent a soldier learns the fundamentals of decision-making tasks in his primary non-commissioned officer courses, but skilled performance of these tasks comes from experience. Further, in the case of the Bradley, skill is achieved through continued practice of the teamwork required from the commander, gunner, and driver in operation of the vehicle.

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PLATOON LEADER TASK RATINGS

The platoon leader ratings were obtained in a slightly different manner from those of the squad leaders, although the basic rating task was the same. A group rating session was not possible since platoon leaders have fairly demanding duty positions, and cannot easily be spared from their regular duties. Additionally, the subject pool is very small since there are only a few individuals performing as Bradley platoon leaders at Fort Benning.

All five lieutenants assigned to Delta Company, 1st Bn, 29th Infantry Regiment, were contacted and asked to perform ratings for the research project. Four of the raters were serving in the duty position of platoon leader; the other was the company executive officer. Three of the men were graduates of the Fort Benning Bradley Commander's Course; the other two had received on-the-job training. All indicated that they felt very experienced with Bradley operations.

In a brief meeting, the purpose of the assessment was explained and questions were answered. The platoon leaders were asked to rate the Bradley leader tasks in their spare or off-duty time, and were told that although it was permissible to discuss the ratings, it was preferable that they be done independently. This latter stipulation was made so that when all the ratings had been completed, an average for each dimension of each task could be taken, with reasonable assurance that the original ratings represented an across-the-board picture of each individual's impressions and perceptions of Bradley platoon leader tasks.

The task list and rating scale was duplicated so that each rater had his own copy. The platoon leaders were given time to look over the list of dimensions to be rated, to become familiar with the procedure, and then an opportunity for questions was given. When it was apparent that all the raters understood the task, they were thanked and told that since they were performing the tasks on off-duty time, they could take several weeks to complete the job, and their ratings would be picked up by the researchers when completed.

Rater Changes

Very soon after the platoon leader rating sheets had been distributed, several duty changes occurred in Delta Company reducing the number of raters available. Therefore, two additional raters were added to the original list. Both were captains who had served with the CONUS Bradley New Equipment Training Team (NETT) and had therefore had extensive experience in every aspect of Bradley operations. The purpose of the assessment was explained to them and they were asked to perform the ratings from the standpoint of a platoon leader. (Since the NETT is a training team, there are no platoon leader level individuals available; captains and non-commissioned officers supervise training.) Both individuals indicated that they would have no difficulty in performing the ratings from the platoon leader's perspective.

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Results

Compilation of Ratings

The results of the ratings from the four platoon leader raters were averaged to make one composite rating. In many cases, all four raters assigned the same value to a particular task on a specific dimension; in others, three of the four rated the task the same way, and the fourth was only slightly different. Where averaging of ratings would have produced a fraction, the nearest larger whole number was used. Thus, if there are any errors from the process of combination, they fall in the direction of overestimating the perceived difficulty, criticality, or newness of the tasks. This process of averaging of the individual ratings was felt to be the closest approximation possible to the consensus ratings obtained from the squad leaders. The remainder of the analysis was identical to that performed on the squad leader ratings.

Training Requirement Priority Index

The data derived from the platoon leader task ratings was analyzed according to the procedures indicated in the Handbook for Training Developers. First, any task which received a zero (0) rating on criticality, newness, or performance difficulty was marked to be eliminated from further consideration for a training device requirement. However, since only four tasks or parts of tasks scored zero on any dimension no tasks were arbitrarily eliminated on this basis.

Next a Training Requirement Priority Index (TRPI) was calculated for each task. The highest TRPI value for the platoon leaders' list of 177 tasks and subtasks reached the maximum value of 36, for the task "precombat inspection of weapons." A group of four tasks had TRPIs of 24: "deploy a dismount team," "specify weapons for direct fire in the attack," "maintain security during movement," and "maintain correct vehicle position" in coverage for the dismount team. The lowest TRPI was 2, for subtasks "conduct a retirement" in retrograde operations, and "use timing" in retrograde. The mean TRPI for all tasks and subtasks was 9.56, with a median and mode of 9.

Practice Requirement Index

In addition to the TRPI, a Practice Requirement Index (PRI) was calculated. The PRIs ranged from a high value of 12 (maximum possible 18) for the task "pre-combat inspection of weapons" to a low of 1, for "conduct a retirement" in retrograde operations and "request replacements" during reorganization of personnel. The mean PRI was 4.53, with median and mode of 4. The entire task list, with the TRPI and PRI for each task, is presented at Appendix D.

To eliminate some of the less critical tasks from consideration TRPI and PRI cutoff scores were set at 9 and 4. Both of these cutoff scores are higher than those established for the squad leaders, but the distribution of indexes merited this choice. For retaining a task for further consideration, the

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TRPI was the main determiner. Tasks that exceeded the TRPI cutoff were then assessed on their PRI; only tasks then exceeding both scores were retained. A list of the 57 tasks which exceeded the cutoff scores is presented at Table 6. (BIFV Soldier's Manual numbers roughly corresponding to some of these tasks are presented at Table 7.)

Interactive Skills Analysis

Further judgmental analysis was made on the 57 tasks which exceeded the TRPI and PRI cutoff point. First, the interactive skills of the task were described, to determine whether the platoon leader performed the tasks alone, or in conjunction with other persons, either within his vehicle, or with individuals in other vehicles. For a platoon leader, the interaction could be with anyone in his vehicle, with his squad leaders or platoon sergeant, with other platoon leaders, or the company commander.

For most of the tasks represented by the platoon leader task list, a primary person or persons for interaction and communication can be specified. Many of his more critical tasks involve the operations of his own vehicle, and therefore entail interaction with his driver and gunner, and occasionally, with any support personnel available. Major interactions with the gunner would include reacting to malfunctions of the main weapon systems and supervision of the many aspects of reorganization as they apply to his vehicle.

As a supervisor, the platoon leader is in contact with his squad leaders and his platoon sergeant in accomplishment of tactical tasks in offensive and defensive operations. These latter tasks are important for the platoon leader; although he is concerned with his own vehicle, he is responsible for the other three under his control, and must at all times be responsive to the company order. Reactions to direct and indirect fire, and performance elements of the attack and defense and deployment of the dismount team also require a great amount of interaction with others, including other platoon leaders.

Behavioral Skills Analysis

Next, the behavior skills exhibited in task performance were described, using the five categories of procedure following, continuous perceptual motor acts, decision-making, visual discrimination, and communication. As was the case with the squad leaders, all 57 of the tasks fit into more than one of the categories (see Table 6).

The BIFV platoon leader often serves two roles: squad leader and platoon leader. When he is occupying the Bradley commander's seat in the vehicle, acquiring targets, laying the gun, and fighting his vehicle, he is performing the duties of a squad leader. When the platoon leader is coordinating the elements of his platoon and interacting on the company level or with other platoons, his perspective changes and decision-making and responding to communications become more important to him. This dual role makes the job of a platoon leader very difficult.

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Table 6

Platoon Leader Ratings

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
Precombat inspection-weapons	36	12	X	X	X	X	X	X	X	X	X	X	X
Deploy dismount team	24	8			X	X	X	X	X		X	X	X
Direct fire, specify weapons	24	8	X	X	X	X	X	X	X		X	X	X
Security during movement	24	6		X	X	X	X	X	X	X	X	X	X
Vehicle position, dism. team	24	4	X	X	X		X	X	X			X	X
Protect against DEWS	18	8	X	X	X	X	X				X	X	X
Weapon malf. 25mm	18	8	X	X	X		X	X	X	X		X	X
Weapon malf. coax	18	8	X	X	X		X	X	X			X	X
Weapon malf. TOW	18	8	X	X	X		X	X	X			X	X
Defense, fire dist & control	18	8		X	X	X	X	X	X			X	X
Reorg, prepare weapons	18	8			X		X	X	X				X
Reorg, troubleshoot weapons	18	8		X	X		X	X	X				X
Reorganiz. reload	18	8			X		X	X	X				X
Reorg. prepare veh & equip	18	8			X		X	X	X				X
Reorg. troubleshoot PMCS veh	18	8		X	X		X	X	X				X
Fire sppt, coverage obstacles	18	6	X	X	X	X	X	X	X				X
Precombat inspection vehicles	18	4	X	X	X	X	X	X	X				X
Combat load vehicles	18	4	X	X	X	X	X	X	X				X
Use DLIC	18			X	X		X	X	X			X	X
Assign sectors dismount	_	8			X	X	X	X	X	X	X	X	X
Maintain commo dismount	16	8		X	X		X	X	X	X	X	X	X
Practice battledrills	16	4		X	X		X	X	X	X	X		X
Covering force for dismount	16	4		X	X	X	X	X	X		X	X	X

Table 6

Platoon Leader Ratings (continued)

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
Exit & remount dismount	16	4	X	X	X			X	X				
Remount casualties, equipment	16	4			X	X	X	X	X	X	X	X	
Recon assembly area	12	8		X	X	X	X	X	X				X
Supervise terrain driving	12	8	X	X	X	X	X	X	X	X	X	X	X
React to direct/indirect fire	12	8	X	X	X	X	X	X	X		X	X	X
Return fire approp. weapons	12	8	X	X	X	X	X	X	X				X
Suppress ATGM	12	8	X	X	X	X	X	X	X		X		X
Use fire control measures	12	8		X	X	X	X	X	X		X	X	X
Target type, #, motion, priority	12	8			X	X	X	X	X		X	X	X
React to emergency-veh. fire	12	8	X		X		X	X				X	X
Take action on contact	12	8	X		X	X	X	X	X		X		X
Call for indirect fire suppt.	12	8	X		X	X	X	X	X			X	X
Consol. clear fields/OCOKA	12	8		X	X		X	X	X				X
Plan supping fires, obstacles	12	8			X	X	X	X	X				X
React to nuclear threat	12	6			X		X	X	X		X	X	X
React to air attack	12	6		X	X	X	X	X	X		X	X	X
Assign assembly area position	12	4	X		X	X	X	X	X				X
Use fire commands	12	4	X		X	X	X	X	X	X	X	X	X
Use effective range weapons	12	4			X	X	X	X	X		X	X	X
Weapon malf. FPW	12	4			X		X	X		X	X	X	X
Supervise movement to contact	12	4	X	X	X	X	X	X	X	X	X	X	X
Attack mounted or dismounted	12	4	X	X	X	X	X	X	X		X	X	X
Sectors/targets for dismount	12	4			X	X	X	X	X		X	X	X
Consolidation security	12	4			X	X	X	X	X	X			X
Reorganiz. key weapons	12	4			X		X					X	X

Table 6

Platoon Leader Ratings (continued)

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
				SKILLS						CONDITIONS			
Reorg. ammo redistribution	12	4			X		X	X	X			X	X
Clear pockets of resistance	12	4			X	X	X	X	X			X	X
Request ammo-reorganization	12	4			X		X				X	X	
React indirect fire/dismount	9	8			X		X	X	X			X	X
Occupy defensive positions	9	8			X	X	X	X	X			X	X
Ident. enemy aves of approach	9	8			X	X	X	X	X			X	X
Prep alt and suppl. positions	9	8			X	X	X	X	X			X	X
Range cards/sector sketches	9	8	X		X	X	X	X	X			X	X
Defend vs long range targets	9	8			X	X	X	X	X			X	X

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Table 7

Platoon Leader Tasks and Soldier's Manual Numbers

Task Name	Soldier's Manual Number(s)
Precombat inspection-weapons	071-313-4003, 071-314-0002, 071-314-0006, 071-324-4002, 071-316-3009, 071-314-0008, 071-313-4004, 071-316-3005, 071-314-0009, 071-311-6001, 071-311-6002
Deploy dismount team	071-324-3052, 071-326-3056, 071-326-5910, 071-326-5918, 071-326-5920, 071-326-3054
Direct fire, specify weapons	071-326-5912, 071-326-5905, 071-326-3054
Security during movement	071-326-3055, 071-326-5915
Vehicle position, dismount team	071-326-3056, 071-326-5910, 071-326-5918
Protect against directed energy wpns	
React to weapon malfunction, 25mm	071-314-0011
React to weapon malfunction, coax	071-313-4006
React to weapon malfunction, TOW	071-316-3002, 071-316-3015
Defense, fire distribution & control	071-326-5905, 071-326-5908, 071-326-3054
Prepare weapons, reorganization	071-326-3060, 071-326-5914
Troubleshoot weapons, reorganization	071-326-3060, 071-326-5914
Reload, reorganization	071-326-3060, 071-326-5914
Prepare veh & equip, reorganization	071-326-3060, 071-326-5914
Troubleshoot, PMCS veh, reorganization	071-326-3060, 071-326-5914
Fire sppt, coverage obstacles	071-326-5902, 071-326-5904
Precombat inspection - vehicles	071-330-3009, 071-324-1008, 071-326-3057
Combat load vehicles	071-326-3057
Use DLIC	071-326-3604
Assign sectors, dismount	071-326-3056, 071-324-3052, 071-326-5918
Maintain commo, dismount	071-326-3056, 071-326-5910
Practice battledrills	071-326-5911
Provide covering force for dismount	071-326-3056
Exit & remount dismount	071-326-3056
Remount casualties, equipment	071-326-3056
Recon assembly area	
Supervise terrain driving	071-324-6001, 071-326-5915
React to direct/indirect fire	071-326-3003, 071-326-3012
Return fire approp. weapons	071-326-3003, 071-326-5905, 071-326-5912
Suppress ATGM	071-326-3012
Use fire control measures	071-324-3052, 071-326-3003, 071-326-5912, 071-326-5917, 071-326-5918, 071-326-3054, 071-326-5905

Table 7

Platoon Leader Tasks and Soldier's Manual Numbers (continued)

Task Name	Soldier's Manual Number(s)
Target type, #, motion, priority	071-326-3052, 071-326-5912, 071-326-3054, 071-326-5905
React to emergency, vehicle fire	071-326-6022
Take action on contact	071-326-3012, 071-326-3003
Call for indirect fire support	071-326-3003
Consol. clear fields/OCOKA	071-326-3060, 071-326-5914
Plan sppting fires, obstacles	071-326-5905
React to nuclear threat	
React to air attack	071-326-5913
Assign assembly area positions	
Use fire commands	071-314-0017
Use effective range weapons	071-326-5905, 071-326-5912
React to weapon malfunction, FPW	071-311-6004
Supervise movement to contact	071-326-5915
Attack mounted or dismounted	071-324-3052, 071-326-5912, 071-326-5917, 071-326-5918
Sectors/targets for dismount	071-324-3052, 071-326-5918
Consolidation security	071-326-3060, 071-326-5914
Key weapons, reorganization	071-326-3060, 071-326-5914
Ammo distribution, reorganization	071-326-3060, 071-326-5914
Request ammo, reorganization	071-326-3060, 071-326-5914
Clear pockets of resistance	071-326-5918, 071-326-3060, 071-326-5914
React to indirect fire, dismount	
Occupy defensive positions	071-326-5902, 071-326-5904
Ident. enemy avenues of approach	071-326-5902, 071-326-5904
Prep. alt/suppl. positions	071-326-5902
Range cards/sector sketches	071-324-2003
Defend vs long range targets	071-326-5902, 071-326-5905

A number of the platoon leader tasks, especially those focusing on inspections and direct fire, appear in all five categories. Of the 57 tasks, 23 involve some aspects of procedure following, where a series of discrete motor steps are performed. Thirty tasks involve perceptual motor skills, with specific actions being dependent on the outcome of other actions, and 36 require some visual discrimination, either in scanning, or in the close attention required in the act of inspection. The skills represented by these categories tend to cluster on the BIFV operator tasks, in which the platoon leader is fighting his own vehicle, and therefore acting like a squad leader.

All 57 of the platoon leader's critical tasks involve decision-making and require some form(s) of communication. This finding is not surprising in view of the platoon leader's role as supervisor, where aspects of command and control and troop leading procedures become more important than the strictly operational tasks.

Each task was also analyzed as to whether the task involved a physical coordination with another operator, or whether the task interaction was of a communicational nature. As is evident from the preceding analysis, although some tasks represent a physical coordination, all tasks represent some sort of interactive communication, either verbal or by some signal. Tasks involving physical coordination are those covering turret operation of the platoon leader's vehicle when he acts as vehicle commander, and his platoon inspections require that he actually physically spot check specific areas.

However, for these, and all other tasks performed by the platoon leader, interpersonal communications play a large part. Each of the interactions with his own vehicle team requires some communication; his contacts with squad leaders and his platoon sergeant may be either face-to-face or by radio, or both. Interactions with company level personnel may also vary in mode, but will always involve interpersonal communication.

Conditions Affecting Performance Analysis

Finally, conditions affecting task performance were studied for their effect on Bradley platoon leader tasks (see Table 6). These distractors tend to interact, thereby increasing their impact. One of the distractors which affects platoon leader performance is noise level, both internal noise and that external to the vehicle. The gun and vehicle noise affect the platoon leader in the same way as they affect the squad leader. Additionally, for the platoon leader, there is a high need for verbal communication, usually on the radio, and a high noise level can make communication difficult and degrade performance.

A high commo load is another factor which is judged to degrade platoon leader performance. The necessity for communication with his own vehicle gunner, driver and such troops as are present combines with the need to communicate with other vehicles within the platoon, and with the company command radio net. The platoon leader needs to be able to communicate with other platoon leaders, and the high commo load represented by all of these varying demands can degrade task performance. The necessity for communicating

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with different vehicles at the same time, on different subjects, presents a very difficult set of tasks.

Enemy contact brings potential for performance degradation to almost all tasks. Actions take on added urgency, delay tolerance is reduced, and the necessity for timely decision-making increases. Penalty for error increases during enemy contact, and the platoon leader is responsible for the personnel and equipment in three vehicles other than his own. During contact, vehicle movement increases, and there is increased need for communication, both with the leader's own vehicle driver, and with other elements in the platoon.

As with the squad leader, another condition affecting the platoon leader's performance of his activities is limited visibility. Almost all of the tasks which a platoon leader may perform are susceptible to deterioration as a result of limited visibility, as command and control measures are much more difficult with reduced visibility.

Inclement weather is very similar to limited visibility in affecting platoon leader performance. Physical discomfort becomes a problem, and the need for stressing safety of personnel or vehicles and equipment is heightened. For the platoon leader, the requirement to operate from any other than an open hatch position makes his leadership job much more difficult, as his visual field is radically reduced. Although this is a problem for any squad leader, the platoon leader's desire to maintain maximum contact with his platoon makes riding "buttoned up" more of a problem.

A final area which impacts on job performance in the Bradley is that of sustained operations. Because of the BIFV's speed, the protection it offers to its occupants, and its ability to fight and move at night, Bradley crews will be involved in operations over long periods of time. Vehicles may be operational for 72 hours or more, and job performance may suffer accordingly. The need for a regular sleep/rest cycle becomes critical for leadership personnel, as their tasks, very decision-oriented, are susceptible to performance degradation after long periods without rest. Fatigue degrades performance in terms of efficiency and safety for personnel and vehicles, and these are important aspects of the platoon leader's troop leading behaviors. The appropriateness, timeliness and accuracy of the platoon leader's decisions affect the mission and the survivability of his platoon; any degradation of his performance may directly and adversely impact on others. Thus, all of the platoon leader's most critical tasks may be directly affected by sustained operations.

Discussion

The discussion that follows is based on many factors that complement the platoon leader ratings. First, during the time period in which instructions were being given to the raters, and when the purpose of the assessment was being explained, the raters made a number of spontaneous comments about the BIFV and their experiences with it. These comments were noted, and specific points were addressed later in informal discussions. Furthermore, extended interviews were conducted with three BIFV SMEs (senior NCOs) about the relative roles of the platoon leader and the platoon sergeant, and about the role of the platoon leader as squad leader for his own vehicle.

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Additionally, BIFV related instruction was monitored, and instructors and students were questioned about their Bradley experiences. Several individuals with mechanized experience were also questioned about the similarities and dissimilarities between the M113 and the BIFV. Points that had emerged with the squad leader ratings were discussed with senior NCOs, and officers with experience in Bradley and in small unit tactics were questioned at length. Impressions and specific answers gained from all these sources were combined to form the basis for the discussion of the platoon leader ratings.

The 57 platoon leader tasks which exceeded the cutoff scores for the TRPI and the PRI can be grouped into several categories and each general area will be discussed separately. Generally, and not surprisingly, the results indicate that the platoon leader's main areas of concern are primarily different from those of the squad leader. Although the platoon leader is concerned about his vehicle and its safe and efficient operation, his responsibility is focused more on activity of the platoon as a whole, i.e., beyond his own vehicle. The platoon leader sometimes serves as vehicle team leader, and when he serves as vehicle commander, he is as concerned as any squad leader about misfires, troubleshooting, and his vehicle performance. Generally, however, the tactical responsibilities are of much greater significance to him, and part of the difficulty of the job of platoon leader in a Bradley platoon is that the leader must learn to keep his platoon tasks in the forefront, instead of getting too involved with the actual fighting of his own vehicle.

The increased responsibility presented by the presence of dismount elements who must be safely and effectively deployed causes high scores for the platoon leader in most of the subtask areas relating to the dismount team, although the specific fire and maneuver activities of a dismounted element were not considered particularly difficult. For Squad Leaders the actual activities of attack and defense missions for a Bradley were not rated as being new or difficult; this was interpreted as being at least partly a function of the squad leader's relatively small opportunity for initiative or influence in these areas. For the platoon leader, however, these activities were perceived as of much greater importance and criticality. Since the platoon leader's responsibility covers the activities of four vehicles and many subordinates in both offensive and defensive missions, the missions themselves and their component tasks achieve relatively greater importance. The actual platoon ratings are presented at Appendix D, and highlights will be discussed.

As previously noted, some of the highly rated tasks focus on the platoon leader's interactions with his own vehicle, and its operations, and with the precombat inspections for the entire platoon. Weapon and vehicle inspection, and attention to weapon malfunction rate high, as do several other assembly area tasks. The specific emergency activity, "react to fire on vehicle," is also an "own" vehicle concern for the platoon leader. Special task areas covering "protect against directed energy weapons," "protect against nuclear or chemical attack," and air defense operations can be interpreted as concerns for the platoon leader's own vehicle, as well as for all the vehicles of the platoon, and these tasks are rated high.

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Another task area scoring high for the platoon leader covers vehicle movement, although th.; area does not score as high as it does for the squad leader. Movement includes tactical movement, movement to contact, and also security on the move, as well as the supervision of terrain driving. The responsibility for the platoon as a whole and the platoon's relationship to the rest of the company impacts on the platoon leader's perception of importance of the movement category. Interestingly, although all of the squad leaders volunteered information aboit the difficulty in communicating with their individual vehicle drivers in the Bradley, the platoon leaders failed to mention this problem. A possible explanation is that the platoon leaders had a much larger concept of movement than did the squad leaders, and specific vehicle movement control was less important than movement of the platoon as a whole. (When the platoon leaders were directly asked about the difficulty of communicating with the driver in a Bradley, they all confirmed the problem as stated by the squad leaders; it was simply of relatively less importance to them.)

Several of the subtasks involved in the deployment of the dismount team score high for the platoon leaders, much more so than for the squad leaders. The raters indicated that the decision to dismount was important, and that the frequent change from leader of mounted elements to leader of the dismounted element occuring in a Bradley platoon presented training considerations. They felt that the procedures to be followed in dismounting, and the position which must be maintained by the vehicles in providing covering force were of considerable importance. This concern for the dismount team is again a function of increased responsibility, where more than one element is involved. As with the squad leaders, the platoon leader raters felt that the activities performed on the ground by a dismounted element were basic fire and maneuver techniques which were neither new nor Bradley-specific; the actions related to mounting and dismounting and the necessity for smooth operations which are Bradley-specific are the important tasks. The platoon leaders also mentioned the difficulty of remounting casualties, again possibly reflecting their perceptions of their supervisory roles.

Various task areas of the attack in offensive operations scored high for the platoon leader raters. Assignments of sectors of responsibility, target priorities, and choice of weapons scored high, as the platoon leaders, much more so than the squad leaders, perceived their roles as those of tactical leaders. Whereas the squad leader is the leader of his vehicle and can afford to concentrate most of his attention on his own vehicle, the platoon leader recognizes that his major emphasis is in relation to the larger picture, of which his platoon and its four vehicles is only a part. Thus, even though offensive operations are not new for platoon leaders, their relative importance to job performance makes them score high even if they are not Bradley-specific. Several tasks related to consolidation are also rated high.

Similarly, many tasks involved in defensive operations are rated high by platoon leaders. Plans for supporting fires and obstacle coverage score high, as do concerns for fire distribution and control. Use of the effective range of weapons concerns the platoon leader, as do range cards or sector sketches, perhaps because they are relatively complex and p. sent new training for Bradley personnel.

Scoring generally higher than the elements of defensive operations, however, are the tasks which comprise the activity of "reorganization." Many of these tasks were rated very high, perhaps again reflecting the platoon leader's sense of responsiblity for the overall picture. As with the squad leaders, post-operational checks, preventive maintenance and troubleshooting of vehicles and weapons systems are very important; so too are some of the areas traditionally allocated to the platoon sergeant, fuel and ammunition resupply. The great awareness of the Bradley's firepower and mobility is reflected in the platoon leader rater interest in the areas of logistical concerns.

Conclusions

The results of the analysis of the ratings of tasks performed by the platoon leader in a Bradley Infantry Fighting Vehicle platoon indicate that for a BIFV platoon leader the most critical tasks in terms of training can be grouped into five general categories: (1) inspections, (2) supervision of tactical movement, (3) effective use and control of firepower, (4) deployment of dismount teams, and (5) techniques of offense and defense.

Inspections

The Bradley platoon leaders feel that leadership in the Bradley is difficult in many of the task areas that reflect the mechanical complexity within the vehicle, or the tasks that occur as a result of these configurations. These tasks primarily involve inspections of vehicles and weapons systems, both before operations have begun, and during periods of reorganization when the platoon is reconstituting the defense or preparing for the next attack. The leaders see these tasks as critical, not only from the standpoint of the integrity of their own vehicle, but also for the platoon as a whole. Although these activities are not considered tactical tasks, they interact with the tactical performance of a platoon in such a way that they cannot be ignored in the platoon leader's training considerations. Other operator tasks which can be included in this task category focus on malfunctions and troubleshooting. Although these are not strictly tactical tasks, their performance is also interrelated to platoon performance as a whole, and all individuals operating in the BIFV must become proficient in them.

Supervision of Tactical Movement

The tasks involved in control and supervision of individual vehicle drivers and the platoon as a whole are not unique to the Bradley; the platoon leader's experience in troop leading, and the company's standard operating procedures cover most of the skills needed. However, the relatively great speed of the Bradley, and the vehicle's ability to operate for extended periods of time in a somewhat independent fashion make the platoon leader's job difficult to the extent that his platoon must have achieved a certain level of teamwork in order to be able to function as a cohesive whole. Battledrills are important in insuring platoon effectiveness, and the leader must have had the opportunity to practice the elements of movement, including

such tasks as specifying vehicle intervals, signaling, and planning for
limited visibility operations. Much of the training needed for a platoon
leader in the movement area comes from practice in teamwork and adherence to
set, specific methods of operation.

Effective Use of Firepower

For the platoon leader raters, as well as for the squad leaders, the
available firepower of the Bradley is an area of great concern. Similarly,
the utilization of each of these weapons to their effective range, and planning
for defensive coverage rate high. Part of the high ratings occuring in this
area are related to the newness of the vehicle. Even though there are some
individuals who have had a relatively great amount of experience in the BIFV,
the number of persons with extensive experience is very limited and none have
had combat experience. As each leader becomes more familiar with the concept
of a fighting vehicle, and more aware of the different weapons and situations
calling for their employment, he will feel more comfortable with the system as
a whole, and uncertainties about the weapon system will be reduced. However,
since the firepower of the Bradley is such an important part of its effective-
ness, training must reflect the present standard and level of Bradley experience,
and continued instruction must be offered in emphasizing the availability of
the various weapons and the particular circumstances under which they can and
should be used.

Deployment of the Dismount Team

The tasks focusing on supervision and control of dismount elements may
become easier over time as platoon leaders become more experienced in making
smooth changes from mounted to dismounted operations. Many of the personnel
now associated with the Bradley have had experience with the M113 Armored
Personnel Carrier, from which the troops always dismount. The Bradley offers
the choice of mounted or dismounted fighting, and the necessity for making the
decision to dismount, and the timing involved, is still a new task for BIFV
leaders. This coordination is perceived as a problem, and the platoon leader's
concern for these tasks is reflected in their high ratings for the tasks
associated with the physical movements of dismount and remount. At present,
leaders tend to hesitate to dismount the ground elements, and continued
instruction is needed in these areas to insure that the BIFV is utilized to
its maximum effectiveness, to include using the dismount element in the
dismounted mode when appropriate. The platoon leaders are aware of the
necessity for them to dismount if the platoon is dismounted, and they feel
that their performance as dismounted infantry leaders is adequately emphasized
in non-Bradley-specific training situations.

Techniques of Offense and Defense

The final task area of major importance for the platoon leader covers
the activities involved in offensive and defensive operations, and the necessity
for coordinations of several vehicles and subordinate leaders within the

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platoon, in compliance with the company plan. The platoon leaders indicated that although they felt secure in their knowledge of the tactical requirements of offensive and defensive operations, they felt that such operations with the Bradley platoon would require great amounts of practice. They expressed the need for extensive teamwork both within vehicles, and between vehicles, and indicated that effective operations would be dependent on the ability of the various elements of the platoon to work together as a whole.

Recommendations

The major areas needing training reinforcement at the platoon leader level can be separated into two categories. First, to the extent that the platoon leader is like a squad leader and in control of the operations of any one vehicle, he needs continued training in operations of the vehicle in the same ways and areas that the squad leader does. He needs to be able to insure his ability to perform all the vehicle leadership tasks, even though that is not his primary role in the Bradley company. These tasks can be trained by many of the devices and part task trainers now currently available. For the platoon leader, like the squad leader, these tasks are difficult only in relation to the other activities also required of him. The platoon leader especially needs to learn these tasks to a point of overlearning, where he does not need to think about them and can perform them almost automatically.

The other major area of attention for the platoon leader involves the activities which are subsumed under the category of troop leading and command and control. Although gunnery skills can be relatively easily trained, leadership qualities and the ability to make decisions quickly and accurately cannot be trained in a short time, or by a single device. To some extent, the Bradley platoon leader has learned the required tasks and has sharpened his skills in his precommissioning and basic officer courses; he learns also during every day he participates in his duty position. However, the more times he is able to practice the activities actually required of him, the more easily the platoon leader will be able to do them, and the better job he will do.

The problems involved in attempting to practice platoon operations reinforce the initially stated reasons for investigating training simulations: platoon level exercises are expensive in terms of all kinds of resources--time, space, money, equipment, and personnel. To that extent, the development of some sort of platoon tactical trainer to give the platoon leader experience in the coordination of activities of the elements of his platoon is needed.

The company commander ratings were obtained in a manner similar to the platoon leader ratings. There were only a few captains at Fort Benning who were also subject matter experts in the Bradley Infantry Fighting Vehicle, although recent personnel changes have expanded these numbers. Furthermore, there were only two individuals who have served as Bradley company commanders, and neither company is a tactical unit.

The individuals who participated in the company commander ratings were five of Fort Benning's captains most knowledgeable about the Bradley. One was the first commander of Fort Benning's Bradley support unit, Delta Company, 1st Bn, 29th Infantry Regiment. This individual gained several years experience with the Bradley when it was very new and had, because of his role as the first Bradley Company Commander, learned considerably more about the vehicle and training requirements than will most persons who will ever occupy the position of company commander.

A second rater was also a company commander, with extensive Bradley experience. The U.S. Army Training Group provided a three week add-on course at the end of its One Station Unit Training to train entry level soldiers in the Bradley 11M MOS Fighting Vehicle Infantryman. This individual commanded the company dedicated to training Bradley Infantry Fighting Vehicle drivers. Again, his training was somewhat more thorough than would normally be expected from a company commander, because of the newness of the BIFV system, and because of the changes which have occurred in the past few years as the Bradley has been fielded and new training strategies have emerged. Since the OSUT trainees, in addition to learning driving and maintenance, learn how to become a Bradley dismount team, this individual's perspective on the issues and elements of deploying the dismount team is particularly good.

The other three company commander raters have all had long association with the Infantry School's Weapons Gunnery and Maintenance Department. One has served as Chief of the BIFV Commander's Course at Fort Benning, and as such, has become knowledgeable in all aspects of Bradley deployment. He has been active in the planning of training for both mechanical operations and tactical employment of the BIFV, and has great familiarity with the training aids and devices available.

Another rater was formerly Chief of the BIFV Gunner's Course at Fort Benning, and became very familiar with the critical aspects of gunnery training during that time. This individual is presently working for the USAIS Directorate of Training and Doctrine in the course development division, where he continues to be cognizant of Bradley-related matters. The final rater formerly served as Deputy Chief of the Maintenance Division at the Weapons Gunnery and Maintenance Department, and is presently Chief of the BIFV Master Gunner's Course at Fort Benning. His knowledge about the Bradley, like that of the other four, is considerably greater than might be expected, especially in the areas of maintenance, gunnery, and training management.

Each of these individuals has served in some capacity with the Bradley for several years. Because of the newness of the system and its relatively recent fielding, and because the resident instruction division and the resident support unit have been an integral part of the planning for the training and use of the BIFV since its inception, these particular individuals seem almost uniquely qualified to comment on Bradley training. Their previous military experience lends them a perspective not enjoyed by either the squad leader or the platoon leader raters and their extensive experience with the Bradley makes them acutely aware of training needs.

Each individual who was to perform the company commander task ratings was interviewed extensively, the purpose of the assessment was explained and questions were answered. The raters were told that although they knew all of the other raters, and were in very frequent contact with them, it was preferred that the ratings be done independently. This latter stipulation was made so that when all the ratings had been completed, a composite picture of each individual's impressions and perceptions of Bradley Company Commander tasks could be achieved.

Results

Compilation of Ratings

The results of the ratings from the five Company Commander raters were combined to make one average rating. In many cases, all five raters gave the same value to a particular task on a specific dimension; on many others, three or four rated the task the same way, and the others were only slightly different. Every effort was made to be consistent in the averaging process, and where combination of ratings would have produced a fraction, the nearest larger whole number was used. The analysis was identical to that performed on the squad leader and platoon leader ratings.

Training Requirement Priority Index

The data derived from the company commander task ratings was analyzed according to the procedures indicated in the Handbook for Training Developers. First, any task which received a zero (0) rating on criticality or newness or performance difficulty was marked to be eliminated from further consideration for a training device requirement. However, only two tasks or parts of tasks scored zero on any dimension; as was the case with the platoon leaders and squad leaders, these tasks were therefore not arbitrarily eliminated.

Next, as specified in the Handbook for Training Developers, a Training Requirement Priority Index (TRPI) was calculated for each task and the resulting TRPIs were rank ordered. The highest TRPI value obtained for the 109 tasks and subtasks that the company commanders rated was 18, for the tasks "use effective range of weapons" and "react to weapon malfunction." A group of five tasks had TRPIs of 16: "use fire control measures," "use patterns of fire," "use fire commands," "identify targets," "direct fire," and "react to

vehicle emergency." The lowest TRPIs were those involving assembly area
activities, supervision of movement, and consolidation, all rated 3; and NBC
coordination, rated 4. The mean TRPI for all tasks was 8.61, with a median
score of 8, and a mode of 6.

Practice Requirement Index

In addition to the TRPI, a Practice Requirement Index (PRI) was calculated.
The PRIs ranged from a high value of 12 for the general task "conduct the
defense," to a low of 1 for "supervision of assembly area activities,"
"precombat checks and inspections," and the subtask of the order giving
process, "receive orders from superior." The mean PRI was 4.87, with a median
of 2 and a mode of 4. The entire task list, with the Company Commander TRPIs
and PRIs for each task, is presented at Appendix E.

A cutoff score of 12 for the TRPI and one of 8 for the PRI is suggested
by the Handbook for Training Developers, to eliminate some of the less critical
tasks from consideration. However, based on the distribution of TRPIs and
PRIs, cutoff points were established at 8 for the TRPI and at 4 for the PRI;
these values are consistent with those used in the squad leader and platoon
leader ratings. A list of the 60 tasks which exceeded the two cutoff scores
is presented at Table 8. (Table 9 shows the correspondence of the company
commander tasks to Bradley Soldier's Manual tasks.)

Interactive Skills Analysis

For those tasks which exceeded the TRPI and PRI cutoff point, further
analysis was performed. First, the interactive skills of the task were
described, to determine whether the company commander performs the tasks
alone or in conjunction with other persons. For a company commander, the
interaction could be with the gunner or driver in his own vehicle, with his
platoon leaders, with his executive officer, with his FIST chief, or with
personnel in any of his attachments. He also interacts with the battalion S3
and the battalion commander. Most of the company commander interactions,
unlike those of the squad leader or platoon leader, are with persons outside
of his own vehicle.

For most of the tasks represented by the Company Commander task list, a
primary person or persons for interaction and communication cannot be specified.
Only a few of his more critical tasks involve the operations of his own
vehicle, and therefore interactions with his driver and gunner, while frequent,
are not seen as the most critical for a company commander. The Commander's
vehicle will rarely fight, and therefore, unlike the squad leader and the
platoon leader, his concerns focus less on gunnery, weapons systems and
movement, and more on the integration of the company in the battalion mission.

As a supervisor, the Bradley Company Commander is in contact with the
battalion and his platoons and attachments for accomplishment of tactical
tasks in offensive and defensive operations. The performance of these tactical
tasks is of major importance for the company commander, as although he must be
concerned with the safety and positioning of his own vehicle, he is responsible
for the others under his control, and must at all times attend to the battalion
order.

Table 8

Company Commander Ratings

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
Use effective range/weapons	18	8			X	X	X	X	X		X	X	X
React to weapon malfunction	18	8	X	X	X	X	X	X	X	X		X	X
Use fire control measures	16	8		X	X	X	X	X	X			X	X
Use patterns of fire	16	8	X	X	X	X	X	X	X			X	X
Use fire commands	16	8	X		X	X	X	X	X	X	X	X	X
Identify targets, direct fire	16	8			X	X	X	X	X			X	X
React to vehicle emergency	16	4	X	X	X			X	X			X	X
Deploy dismount team	12	8			X	X	X	X	X		X	X	X
Coordinate with FIST	12	8	X		X		X			X	X	X	X
Call for indirect fire support	12	8	X		X	X	X	X	X			X	X
Call for lift/shift fires	12	8	X	X	X		X			X	X	X	X
Take action on contact	12	8	X		X	X	X	X	X		X		X
Return fire on contact	12	8		X	X	X	X	X	X		X	X	X
Develop situation after contact	12	8		X	X	X	X	X	X	X	X	X	X
Attack	12	6	X	X	X	X	X	X	X		X	X	X
Determine mounted/dismounted attack	12	6			X	X	X	X	X			X	X
Call for fire support/attack	12	6	X		X	X	X	X	X			X	X
Use METT-retrograde	12	4			X		X	X	X			X	X
Assign positions-retrograde	12	4			X		X	X	X		X	X	X
Assign routes-retrograde	12	4			X		X	X	X		X	X	X
Maintain security-retrograde	12	4			X	X	X	X	X	X	X	X	X
Use timing-retrograde	12	4			X		X	X	X	X	X	X	X
Use deception-retrograde	12	4		X	X		X	X	X	X	X	X	X

Table 8

Company Commander Ratings (continued)

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
Use DLIC	12	4	X	X		X		X	X			X	X
Conduct movement-retrograde	12	4	X	X		X		X	X			X	X
Use passage of lines-retrograde	12	4	X	X		X		X	X			X	X
Plan fire support-retrograde	12	4	X	X		X			X			X	X
Conduct a delay	12	4			X		X	X	X			X	X
Conduct a withdrawal/pressure	12	4			X		X	X	X			X	X
Conduct withdrawal/no pressure	12	4			X		X	X	X				X
Conduct retirement	12	4			X		X	X	X			X	X
Conduct the defense	9	12	X	X	X	X		X	X			X	X
Assign targets/defense	9	8			X		X	X	X			X	X
Defend vs long range targets	9	8	X	X	X	X		X	X			X	X
Defend vs close in targets	9	8	X	X	X	X		X	X			X	X
Specify distrib/concentr fire/def	9	8	X	X	X	X		X	X	X	X	X	X
Specify type fire/defense	9	8			X		X	X			X	X	X
Assign area coverage/defense	9	8			X		X	X			X	X	X
Maintain turret orientation/def	9	8	X	X		X						X	X
Specify ammo type/defense	9	8			X		X					X	X
Supervise mvmt alt/supp posns/def	9	8			X	X	X	X	X			X	X
Maintain fire dist & control/def	9	8		X	X	X	X	X	X			X	X
React to directed energy weapons	9	8	X	X	X	X	X				X	X	X
Return fire with appropriate wpns	9	8		X	X	X	X	X	X			X	X
OPORD/restrictions on fire spt	9	4			X		X				X		X
React to direct/indirect fire	9	4	X	X	X	X	X	X	X		X	X	X
Occupy defensive positions	9	4			X	X	X	X	X			X	X
Coordinate fire support plan	9	4			X		X	X	X	X	X	X	X

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Table 8

Company Commander Ratings (continued)

TASK NAME	TRPI	PRI	Procedure following	Perceptual motor	Decision making	Visual discrimination	Communication	Limited visibility	Weather	Noise	High commo load	Enemy contact	Sustained operations
			SKILLS					CONDITIONS					
Choose course of action on contact	8	8		X	X	X	X	X	X		X	X	X
Report action on contact	8	8	X		X		X			X	X	X	X
Direct fire/attack	8	6		X	X	X		X	X			X	X
Specify weapons/attack	8	6		X	X	X					X	X	X
Assign targets & priorities/atk	8	6	X		X		X				X	X	X
Assign sectors/attack	8	6	X		X		X				X	X	X
Report to higher HQ	8	4	X		X		X			X	X	X	X
Use smoke/attack	8	4			X		X	X	X			X	X
Use illumination plans/attack	8	4			X		X	X	X			X	X
Use limvis devices/attack	8	4	X		X		X	X	X			X	X
Assault line-location & signal	8	4			X		X	X			X	X	X

Table 9

Company Commander Tasks and Soldier's Manual Numbers

Task Name	Soldier's Manual Number(s)
Use effective range weapons	071-326-5905, 071-326-5912
React to weapon malfunction	071-314-0011, 071-313-4006, 071-316-3002, 071-316-3015, 071-311-6004
Use fire control measures	071-324-3052, 071-326-3003, 071-326-5912, 071-326-5917, 071-326-5918, 071-326-3054, 071-326-5905
Use patterns of fire	071-326-5905
Use fire commands	071-314-0017
Identify targets/direct fire	071-326-5912, 071-326-5915, 071-326-5905, 071-326-5908
React to emergency, vehicle	071-326-6022
Deploy dismount team	071-324-3052, 071-326-3056, 071-326-5910, 071-326-5918, 071-326-5920, 071-326-3054, 071-326-5904, 071-326-5905, 071-326-5908
Coordinate with FIST	071-326-5905
Call for indirect fire support	071-326-3003, 071-326-5905
Call for lift/shift fires	071-326-5905
Take action on contact	071-326-3012, 071-326-3003, 071-326-5915
Return fire on contact	071-326-3003, 071-326-5915
Develop situation after contact	071-326-5912, 071-326-5915, 071-326-3003
Conduct retrograde operations	071-326-5604
Attack	071-326-5911, 071-326-5912, 071-326-5915, 071-326-5917
Determine mounted/dismounted attack	071-326-5912, 071-326-5917, 071-326-5918, 071-326-5905
Call for fire support/attack	071-326-5917
Use METT/retrograde	071-326-3604
Assign positions/retrograde	071-326-3604
Assign routes/retrograde	071-326-3604
Maintain security/retrograde	071-326-3604, 071-326-5907
Use timing/retrograde	071-326-3604
Use deception/retrograde	071-326-3604
Use DLIC	071-326-3604
Conduct movement/retrograde	071-326-3604, 071-326-5911
Use passage of lines/retrograde	071-326-3604
Plan fire support/retrograde	071-326-3604
Conduct a delay	071-326-3604
Conduct a withdrawal/pressure	071-326-3604
Conduct a withdrawal/no pressure	071-326-3604

Table 9

Company Commander Tasks and Soldier's Manual Numbers (continued)

Task Name	Soldier's Manual Number(s)
Conduct a retirement.	071-326-3604
Conduct the defense.	071-326-5905, 071-326-5908
Assign targets/defense.	071-326-5905, 071-326-5908
Defend vs long range targets.	071-326-5902, 071-326-5905, 071-326-5908
Defend vs close in targets.	071-326-5902, 071-326-5905, 071-326-5908
Specify distrib/conc. fire/defense.	071-326-5905, 071-326-5908
Specify type fire/defense.	071-326-5905, 071-326-5908
Assign area coverage/defense.	071-326-5902, 071-326-5905, 071-326-5908
Maintain turret orientation/defense.	071-326-5905
Specify ammo type/defense.	071-326-5905
Supervise mvmt alt/suppl. posns/def.	071-326-5904, 071-326-5905, 071-326-5908
Maintain fire dist. & control/def.	071-326-5902, 071-326-5905, 071-326-5908
Protect against directed energy wpns.	
Return fire with appropriate wpns.	071-326-3003, 071-326-5905, 071-326-5912, 071-326-5917
OPORD/restrictions on fire support.	
React to direct/indirect fire.	071-326-3003, 071-326-5917
Occupy defensive positions.	071-326-5902, 071-326-5904, 071-326-5905
Coordinate fire support plan.	071-326-5905
Choose course of action on contact.	071-326-5912, 071-326-3003, 071-326-5917, 071-326-5918
Report action on contact.	071-326-5912, 071-326-3003, 071-326-5917, 071-326-5918
Direct fire/attack.	071-326-5912, 071-326-5917, 071-326-5918
Specify weapons/attack.	071-326-5912, 071-326-5917, 071-326-5918
Assign targets/priorities/attack.	071-326-5917, 071-326-5918
Assign sectors/attack.	071-326-5917, 071-326-5918
Report to higher HQ.	071-326-5915, 071-326-5917, 071-326-5918
Use smoke/attack.	071-326-5804
Use illumination plans/attack.	
Use limvis devices/attack.	
Assault line/location & signal.	071-326-5915

Behavioral Skills Analysis

Next, the behavior skills represented in company commander task performance were described, using the five categories of procedure following, continuous perceptual motor acts, decision making, visual discrimination, and communication. (See Table 8.) As was the case with the squad leaders and platoon leaders, many of the tasks fit into more than one of the categories and a number of tasks scored in all five categories. Of the 60 tasks, 15 involve some aspects of procedure following. These occur primarily because of the necessity for the company commander to use the radio to communicate his plans to others. Perceptual and motor skills are involved in 24 tasks and 29 involve some aspects of scanning or visual discrimination. A number of tasks score in this category because of the necessity for reconnaissance in both offensive and defensive operations.

All 60 of the company commander's high rated tasks involve decision making, and all 60 require some form(s) of communication. This finding is not surprising in view of the company commander's role as supervisor, where aspects of command and control and troop leading are critical, and far outweigh the operational tasks so important to the leaders at other levels.

Each task was also analyzed as to type of coordination. As is evident from the preceding analysis, although some tasks represent a physical coordination, all tasks represent some sort of interactive communication, either verbal or by some signal. Tasks involving physical coordination are those covering operation of the company commander's own vehicle, and any areas in which he must actually physically spot-check specific areas during inspections. However, for these and all other tasks performed by the Company Commander, interpersonal communications play a large part. Each of his interactions with his own vehicle team requires some verbal communication; his contacts with platoon leaders and his support units may be either face-to-face or by radio, or both. Interactions with company and battalion level personnel may also vary in mode, but will always involve interpersonal communication.

Conditions Affecting Performance Analysis

Finally, conditions affecting task performance were studied for their applicability to Bradley Company Commander tasks. (See Table 9.) One of the distractors which may affect the company commander's performance is noise level. The noise of opposing or friendly gunfire, the constant sound of the engine, and the noise from the vehicle's movement can have a cumulative effect. With the company commander's requirement for verbal communication, usually on the radio, a high noise level can seriously degrade communication. A high commo load can degrade the company commander's performance, although he may be better able to cope with this problem than the platoon or squad leader. Communication with other elements of the company net and with the battalion is a high priority task for the commander and his staff.

Enemy contact brings added urgency to all tasks, delay tolerance is reduced, and the necessity for timely decision making increases. Vehicle movement and communication are more frequent, and penalties for errors increase.

Another condition which may affect the commander's performance is limited visibility, including night and daytime degraded visibility. All of the critical tasks of a company commander are susceptible to deterioration as command and control measures are much more difficult during periods of reduced visibility.

Similarly, inclement weather affects the company commander's performance. Physical discomfort becomes a problem, and the need for stressing safety of personnel or vehicles and equipment is heightened. For the commander, the requirement to operate from any other than the open hatch position makes the leadership job more difficult, as visibility is radically reduced. Although this is a problem for the squad leader operating one vehicle, or for a platoon leader, the company commander's need to maintain maximum visual contact makes riding "buttoned up" a particularly severe problem.

A final area which impacts on job performance in the Bradley is sustained operations. The need for a regular sleep/rest cycle is important for all personnel, but becomes more critical at higher leadership levels as their tasks, very decision-oriented, are susceptible to performance degradation after long periods without rest. Fatigue reduces efficiency and impacts on troop leading behaviors. The appropriateness, timeliness and accuracy of the commander's decisions affect the mission and the survivability of the company; any degradation of performance may directly and adversely impact on others and on the mission itself.

Discussion

The discussion that follows is based on many factors that complement the company commander ratings. First, during the instruction period when the purpose of the assessment was being explained, several of the raters made a number of spontaneous comments about the BIFV and their experiences with it. These comments were noted, and specific points were addressed later in informal conversations. Several also made comments on their rating sheets, and one included a two-page summary of his observations for training needs.

Additionally, BIFV-related instruction was monitored, and instructors and students were questioned about their Bradley and M113 experiences. Points that emerged with the company commander ratings were discussed with senior NCOs, and officers with experience in small unit tactics were questioned at length. The BIFV Commander's Course tactics instruction offered by USAIS was also monitored. Impressions and specific information gained from all these sources were combined to form the basis for the discussion of the company commander ratings.

The 60 company commander tasks which exceeded the cutoff scores for the TRPI and the PRI can be grouped into several major categories. Results indicate that the company commanders' main areas of concern are very different

from those of the squad leader, and in many respects different from the platoon leader. Although the commander is concerned about his own vehicle and its safe and efficient operation, his responsibility is focused on activity of the company as a whole, rather than on the activities of any one vehicle within the company. The commander's vehicle will rarely be called upon to fight, and therefore his tactical responsibilities assume much greater significance. The company commander ratings are presented at Appendix E and highlights will be discussed.

The highest rated task for the company commander raters involved using the effective range of the weapons systems on the Bradley. The raters commented on getting used to the availability of both the TOW and the 25mm gun, and the necessity of using the weapons to their fullest capacities. The high ratings incurred by "use of fire control measures," "patterns of fire," and "identification of targets for direct fire" also reflect the commander's concern with the question of weapon effectiveness.

Another high rated task concerned weapon malfunctions. Unlike the platoon and squad leaders, the company commanders did not distinguish between separate weapons in their concern about malfunctions. When questioned, they indicated that their high ratings were a response to the training required by a new system, and the overall effect on the mission created by weapons which are temporarily unavailable for use. They accorded more importance to the 25mm gun, but preferred to group malfunctions and emergencies together.

The increasing complexities presented by the presence of dismount elements who must be safely and efficiently deployed caused high scores for the company commanders in the entire task area relating to the dismount team. The commanders rated all aspects of deployment together, as inseparable and very critical to the effective use of the BIFV. In the subtasks of offensive operations, the decision on whether or not to dismount was also ranked very high.

While many aspects of the activities of attack and defense missions for a Bradley were not considered particularly new or difficult, some score fairly high for the company commander who must integrate the activities of his company with all other aspects of the situation. The squad leader had relatively minor concern with the specifics of a mission, perceiving little option for initiative; for the platoon leader, these activities were perceived as of much greater importance and criticality. Since the company commander's responsibility area covers the activities of twelve BIFVs besides his own, plus numerous other vehicles and many personnel in both offensive and defensive missions, it is not surprising that the missions and their component tasks achieve much greater importance.

Several aspects of the conduct of the attack and defense scored high, especially in the areas of fire control and area coverage. Occupation of defensive positions, especially movement to alternative and supplementary positions scored high. The company commanders expressed particular concern with all aspects of coordination for indirect fire. The task "coordinate with FIST chief" rated high, as did subtasks involving calling for, or lifting or shifting indirect fire. Elements of the attack, including specification

of weapons and targets, and assignment of priorities, were rated high, as were
the use of smoke, illumination plans under limited visibility, and the use of
night vision devices. Commanders were concerned with platoon areas of respon-
sibility and the need to insure that coverage, while complementary, was not
duplicated.

Another area which was rated extremely high by the company commander
raters involved retrograde operations. The entire task area was considered
critical, and nearly all of the subtasks were perceived as being very difficult.
Questioned, however, several commanders noted that retrograde operations are
always difficult, and would be no more or less so for a BIFV company than a
M113 company. Their high ratings were therefore a function of the difficulty
of the task in general, rather than a reflection of Bradley-specific tasks.

Conclusions

The results of the ratings performed by company commander raters indicate
that for a BIFV company commander, the most critical tasks in terms of training
can be grouped into five general categories: (1) effective use and control of
firepower, (2) deployment of dismount teams, (3) coordination of indirect fire
support, (4) offensive and defensive operations, and (5) retrograde operations.

Effective Use and Control of Firepower

For the company commander, as well as for the platoon leader and the
squad leader, the effective use of the BIFV weapons system is of great impor-
tance. The platoon and squad leaders were concerned about the weapons as
individual pieces of equipment, whereas the company commanders tended to see
them as component parts of the entire company weapons system. Fire control
measures and the use of patterns of fire combine with target identification
and prioritization to give a picture of commanders concerned with the battle-
field as a whole, encompassing the activities of each of their platoons.

At the present time, the commanders interviewed have had only limited
experience with the BIFV in a tactical environment, although they indicate
that their previous troop leading experiences have prepared them for the
effective use of the BIFV in a mechanized situation. As the individuals
involved have gained more experience with the vehicle, their uncertainties
about its most effective use may decline, but at the present time, training
must reflect the current state of knowledge.

Deployment of Dismount Teams

For the company commander, deployment of the dismount elements is
important. Many of the present BIFV commanders have had experience with the
M113 personnel carrier from which troops always dismount for battle. The
commanders often have not analyzed the differences and similarities between
the two vehicles. The most effective use of the vehicle lies somewhere
between the two extremes, where the troops in the dismount element are used

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for the traditional infantry skills, and the vehicle and its firepower
are used in support. The company commander, unlike the squad leader, is not
concerned with the mechanics of the dismount. His focus is on the philosophy
of the dismount, and the need to keep the troops close enough to the vehicles
to be afforded their protection, but far enough away so as to be safe from
fires that are directed at the vehicle. The troops need to be mobile when
dismounted from the Bradley, but must be placed in locations to insure that
they are not endangered by their own supporting fires. Commanders, in their
training, must learn to acknowledge the differences in techniques required for
effective deployment of troops in the dismount mode, and to distinguish the
behavior patterns for the M113 which must be changed with the BIFV.

Coordination of Indirect Fire Support

Coordination of indirect fire support is a serious problem for the
company commanders. They realize that the task of providing fire support for
a widely spread out company can be difficult, and requires careful communication.
The location of the platoon forward observer must be established, and coordi-
nation with the company FIST is essential. Since fire support may call for
lifting or shifting of called-in fires, communication remains critical. The
company commander relies on his FIST chief for much of the activity in this
area, but to the extent that the ultimate responsibility remains with the
commander, the raters scored all of the indirect fire support tasks high.

Offensive and Defensive Operations

Actions on contact and all of the elements of offensive and defensive
operations are of great concern to the company commander, to a much greater
extent than for the leaders at lower levels. When questioned, the squad
leaders saw their roles in a mission as relatively small in relation to the
larger picture, that their major concerns focused on their own vehicles and
the operation and gunnery tasks which were required of their own specific
vehicles. The platoon leaders felt some of the same concerns as they indicated
that their missions would be decided on the company level, and they, as
platoon leaders, would have only restricted initiative; their ratings reflected
this. The company commanders, however, felt that they had a great deal of
influence, even within the battalion order, as they had the ability to make
decisions and materially affect the action. Since they have the opportunity
to develop situations and make decisions, the commander raters gave high
ratings to these types of tasks.

Specification of targets and priorities, sectors of fire, and use of
smoke and illumination plans rated high as these activities also fell within
the commander's individual decision-making prerogatives. Assignment of
primary, alternate and supplementary positions, area coverage and fire
distribution and control were also seen as within the commander's sphere of
influence.

However, the company commanders did not feel that any of the preceding
tasks were of any great intrinsic difficulty, nor did they perceive them as
being more difficult in a BIFV company than in a M113 company. They indicated

that the commander must be aware of the strengths and weaknesses of his platoons and key personnel, and stressed the importance of troop leading and command and control procedures. They felt that the BIFV's major impact was in the area of offering more options for the commander to consider.

Retrograde Operations

The final area of major concern to the company commanders who rated the tasks was that of retrograde operations. To some extent the high ratings may be a function of the limited experience each of the individuals performing the ratings has had with this type of operation. To a great extent, however, the operations involved in retrograde activities are always confusing and complicated, and there is little room for error; this may help to account for the high ratings. Questioned, several indicated that they saw no more difficulties with the BIFV in retrograde than with other mechanized units; the activities are always taxing for the company commander.

Recommendations

The major areas needing training reinforcement for the company commander appear to be in several discrete but interrelated areas. First, and without fail, the company commander must become familiar with the mechanical operations of the BIFV, to include the elementary operations of driving, maintenance, and gunnery. The commander need not reach the level of skill required by a leader at a lower level who is required to fight his vehihle, but the commander must at all times be aware of the tasks which his junior officers and NCOs are being required to do. With an understanding of the entire array of tasks which these individuals must perform, the commander is better able to gauge the time required to perform certain activities, and is better able to understand the demands being placed on the squad and platoon leaders by the complexities of the vehicle itself.

Command and control are a part of any military operation, but there does not appear to be much to make these items more difficult in a BIFV company than in any other. Communication problems, the speed of the vehicle in causing more widely spread operations, and the potential for outrunning the company logistical support are mentioned as concerns by commanders, but these concerns are only magnified in the Bradley, not unique to it.

The raters felt that offensive and defensive techniques required of a BIFV commander are little different from other mechanized techniques; they felt that commanders would need practice in integrating the fires of the dismount elements and the vehicles, and in utilizing the capabilities of both elements to the maximum, but other actions would change little.

Since BIFV specific skills are already taught in the Fort Benning resident instructional courses, little more needs to be said about these areas of training for the company commander. Operations and maintenance are easily learned through the Commander's Course, or through NET training in units. The professional development courses and commander's courses teach both leadership and basic mechanized tactics; although some question remains as to their adequacy.

The Bradley battalion commander is responsible for all that his unit does or fails to do, and for the command and control of organic, assigned, attached, and other support elements. Although subordinate commanders are accountable for their own units' activities, the battalion commander is ultimately responsible for the activities of those personnel assigned to positions which report to him. For the same reasons, he must also be cognizant of the tasks performed by his staff and special staff. Staff functions are the same for Bradley battalions as for other non-Brad¹⁄ battalions; the specific content, however, reflects the capabilities of the L FV.

The battalion commander's major role is that of providing leadership through careful planning and decision making. He issues orders and supervises their execution, and shows his concern for his soldiers by his skills and understanding in the use of subordinates.

Battalion Staff

The battalion commander's task list includes the contents of the task areas of the battalion executive officer (XO), the staff officer in charge of personnel (S1), the staff officer in charge of intelligence (S2), the staff officer in charge of operations (S3), the staff officer in charge of logistics (S4), and if assigned, the staff officer for civil and military operations (S5). The battalion staff's activities center on five common functions: providing information, making estimates, making recommendations, preparing plans and orders, and supervising the execution of decisions. These staff functions occur in six main areas: personnel, intelligence, operations and training, communication-electronics, logistics, and military-civilian operations.

The commander must also be aware of the areas of responsibility of other staff officers and representatives of major brigade or division support elements which interact with him. Special staff may include a communications-electronics officer, who at battalion level commands the communication platoon, a maintenance officer responsible for maintenance and maintenance training, and a motor officer responsible for transportation and possibly maintenance. There may also be a material readiness officer, a chaplain, an aviation officer, a provost marshall, and the battalion sergeant major who advises the commander on matters concerning enlisted personnel.

The battalion commander has overall responsibility for the tactical estimate of the situation. This estimate or concept of operations is based on reports and information provided by personnel who report either directly or indirectly to him. In order to be able to assimilate this information as it relates to the Bradley battalion, the commander must first be aware of the Bradley's capabilities and limitations, and of the tasks involved in vehicular operation. He must be aware of the capabilities, strengths and vulnerabilities of the weapons systems, and the mounted and dismounted elements. He must be able to integrate this vehicle-specific information with the logistic, personnel, intelligence, and tactical situation reports provided to him by his subordinates.

Since the Bradley battalion commander is indirectly responsible for the same kinds of tasks as the Bradley company commander, the battalion commander's task list remains essentially the same as that of his subordinate leaders, with certain specific additions. Some of the primary additions to the battalion commander list include the duties of his staff. These tasks are covered in great detail in a number of field manuals and reference books, most particularly:

FM 7-20 The Infantry Battalion (Infantry, Airborne, Air Assault, Ranger). (1978, April).

FM 71-2 The Tank and Mechanized Infantry Battalion Task Force. (1977, June).

FM 100-10 Combat Service Support. (1983, March).

FM 101-5 Staff Officers Field Manual: Staff Organizational, Technical, and Logistical Data. (1972, July).

RB 101-5 Staff Organization and Operations. (1983, May) U.S. Army Command and General Staff College, Ft. Leavenworth, KS

ST 7-150 FY76 Operations Handbook. (1976). U.S. Army Infantry School, Ft. Benning, GA

TT 71-2J The Mechanized Infantry Battalion Task Force (Coordinating Draft). (1982, July).

The specific duties and responsibilities of these major staff officers are included in Appendix F but a brief overview of each position and its responsibilities follow:

The Executive Officer. The Executive Officer (XO) frees the commander from routine details by directing, supervising, and insuring coordination of the work of the staff, except in the specific areas reserved by the commander. His responsibilities include formulation and announcement of staff operating policies; insuring that the commander and staff are kept informed; insuring that the commander's decisions and concepts are implemented; maintenance of a master policy file and SOP; insuring establishment of required liaison; keeping informed of the activities of coordinating or staff officers who report directly to the commander; supervision of main command post operations, and assistance to coordinating staff officers by formation and staffing of sections in their fields of interest. The executive officer may also be assigned tactical responsibilities (e.g., command a task force) at the discretion of the battalion commander. He also commands the battalion in the absence of the battalion commander.

Personnel. The S1/Personnel Officer is principal staff officer for the commander on all matters concerning human resources and personnel readiness. He monitors and assesses elements of personnel administration and mangement which provide policies, services, and facilities affecting the soldier's human potential and commitment. His responsibilities include maintenance of unit strength; maintenance of discipline, law and order; support for civilian personnel; administrative support for other personnel; safety and accident prevention; morale services and headquarters management.

Intelligence. The S2/Intelligence Officer is principal staff officer for the commander on all military intelligence matters. He acquires intelligence information and data, analyzes and evaluates this information and data, and presents the assessment, evaluation and recommendation to the commander. He thereby permits the commander to see the whole battlefield, and to identify key targets throughout the command area. He uses plans, orders, and SOPs to direct all intelligence and counterintelligence roles. His responsibilities include production of intelligence; counterintelligence; and intelligence training.

Operations. The S3/Operations Officer is principal staff officer for the commander concerning operations, plans and training, with a high degree of coordination with other staff memebers. His responsibilites include the major planning for the concept of operations including coordination of the operations of subordinate units; the battalion organization; and all training. (The comprehensiveness of the S3's tasks is evident in the descriptions contained in Appendix F.)

Logistics. The S4/Logistics Officer is principal staff officer for the commander in matters of supply, maintenance, transportation, and services. He maintains close and continuous contact with the support command commander who is responsible for logistic support, and with the S3, for support of tactical operations. His responsibilities include supply; transportation; maintenance; and services.

Civil-Military Operations. The S5/Civil-Military Operations Officer, when assigned, is principal staff officer concerning the civilian impact on military operations, and the political, economic and social effects of military operations on civilian personnel. His responsibilities include activities embracing the relationship among military forces, civil authorities, and people in the area of operations.

Special Staff. There are a number of special staff officers who have specific areas of responsibility within the battalion. Their areas of supervision and influence add to the coverage provided by the main staff officers, and the battalion commander must be aware of their duties as well. The staff officers vary with the battalion and the mission, but the following are typical staff positions. The communications officer supervises employment of communications systems and equipment and training of personnel in their use. The battalion motor officer focuses on maintenance. Another member of the special staff is the surgeon who has overall responsibility for the medical platoon and the battalion aid station. He supervises first aid, disease control, and the health of the battalion. The battalion chaplain is responsible for morale and activities of a religious nature. He provides counseling where necessary and helps insure a positive morale within the battalion. Another special staff officer is the chemical officer or the NBC officer (or NCO) who keeps records on nuclear and chemical predictions and dosages. Other special staff may be assigned to a battalion, and the commander must be aware of their functions.

Battalion Level Task List Analysis

Since the list of tasks for a Bradley Infantry Fighting Vehicle battalion commander is mainly a compendium of the company commander's task list plus the task lists of the battalion staff, a task analysis as performed for the company commander, platoon leader and squad leader levels was not performed. (The list of Company Commander Tasks presented at Appendix E is applicable to the battalion commander, and other battalion level tasks will be discussed later.) Although there has been some interface with individuals performing at the level of battalion commander, there has been no attempt to have the tasks rated in terms of criticality or training device requirements.

During the supplementary analyses performed on the squad, platoon, and company commander level tasks, it became apparent that most of the tasks critical to Bradley leaders at these levels of leadership were those that required some aspects of decision making. It is also evident that the battalion commander's critical tasks are communication tasks, usually involving more than one other individual. Like the company commander, the battalion commander's interactions are usually with persons outside of his own vehicle. The battalion commander has both interpersonal communication and radio communication with the brigade and with personnel throughout his battalion, especially with his staff and subordinate commanders. The behavioral skills required by the battalion commander therefore fall heavily in the areas of communication and decision making.

A further analysis applied for the squad, platoon and company commander leaders was that focusing on the external conditions which have a detrimental effect on the BIFV leader's performance of his tasks. As is expected, the battalion commander's task performance can be degraded by external variables. One previously mentioned distractor, noise level, would seem to have limited application to the battalion commander's task performance. Although his tasks require communication, a high noise level impacts more on within vehicle communication than on between vehicle radio communication.

However, the problems created by adverse weather conditions and by limited visibility definitely create difficulty for the battalion commander. To the extent that the commander's main job is command and control of the vehicles and personnel in his battalion, poor visibility conditions, whether from precipitation, smoke or darkness, make his job much more difficult. The decisions which the commander must make are not themselves more difficult; the information and data gathering process becomes more difficult under these circumstances. Limited visibility operations require extensive planning, both with and without illumination, and require that the battalion be able to move and fight effectively, and with optimum use of night vision devices. Any condition which can dramatically affect the battalion's performance is of importance to the commander; his command and control problems increase with the complexities of the tasks to be performed by his subordinates.

Two other distractors for BIFV leaders are enemy contact, and a high communication load. Although both of these are important for the battalion commander, they have less of an impact on him, at his relatively high level of performance, than they do on subordinate leaders. The battalion commander's

job is mainly decision making and communicating those decisions, especially under pressure. He at all times has a high communication load, and enemy contact, although potentially stress producing, is the main reason for his presence in the situation. To the extent that high communication loads and enemy contact are the basis of his job, they are less <u>distractors</u> to task performance than they are <u>components</u> of task performance.

Also important as a distractor to job perfomance for the battalion commander is the effect of sustained operations. Because the battalion commander's decisions are so far reaching and have impact on so many other people and their job performance, the battalion commander must make every effort to remain alert and to take periods of rest on a regular basis. The consequences of fatigue produced errors in decision making are more dramatic than the effects of similar errors made by subordinates.

Discussion

Battalion Commander's Estimate of the Situation

A primary task for the Bradley battalion commander is the preparation of the estimate of the situation, or the commander's concept. This estimate, forming a major portion of the background for the operations order, is the basis for the decision on how to accomplish a given mission. The estimate is reached through consideration of the mission, enemy, terrain, and weather, troops available, and time (METT-T) and other relevant factors. The commander's estimate is based on his skill and experience, personal knowledge of the situation and on staff estimates. He must also take into consideration both the strengths and weaknesses of his battalion, including those Bradley-specific factors that impact on his planning.

The estimate of the situation must contain a clear, concise estimate of the general scheme of maneuver and the supporting fires for the operation as it is used to develop the remainder of the tactical plan. The commander's estimate integrates a number of elements or steps which are supplemented by the subordinate commander's estimate of the situation, and staff estimates from operations, personnel, intelligence, logistics, civil-military operations, the deception estimate, operations security and psychological operations. (The specific steps in construction of the commander's estimate are detailed at Appendix F.)

The commander must identify the tasks which must be performed, the purpose to be achieved through accomplishing the assigned tasks, and con-straints on his unit's actions. He must plan task organization, control measures, employment of major maneuver elements, command and control arrange-ments (tactical missions, command relationships, and command post locations), and activities in the deep, close, and rear area battle areas. He must plan fires to support the maneuver, mission oriented protective posture (MOPP), rear area combat operational responsibilities, and contingency plans. He must plan for the employment and use of reserves, air defense, smoke, protection of friendly and disruption of enemy elements, engineer operations, attack helicopters, offensive air support, and liaison-coordination.

Bradley Battalion Commander Own Vehicle Considerations

Since the Bradley battalion commander rides in a BIFV, he must perform some of the same functions and tasks as the Bradley squad leader who must insure that his driver and gunner are aware of the tactical situation, and are prepared to perform their duties as necessary. Although the BIFV commander's vehicle will not routinely be called upon to be a fighting vehicle, the driver must be ready to respond to movement commands to insure that the commander can stay abreast of the tactical situation in a timely and safe manner. The gunner, while not expected to have to search for targets and to engage them on the same basis as other gunners, must nevertheless be aware of the possibility of hostile fire, and must be alert to his responsibilities for protection of the commander's vehicle, whether at the forward command post or an observation post. His duties will vary with the situation, and the BIFV battalion commander must be attuned to the readiness of his own vehicle crew to perform.

Battalion Movement

The BIFV can cross open terrain at high rates of speed, and can negotiate both natural and manmade obstacles and barriers that have heretofore been impassible for mechanized battalions. However, the commander must be aware of the limitations of the BIFV, and not try to make it perform beyond its capabilities; the engineer support made available to the battalion must be utilized to maximize the BIFV's potential. Engineers can help in the clearing of defensive positions, or can be used to clear passageways that the BIFV cannot negotiate.

The Bradley battalion contains 54 Bradleys and assorted personnel carriers, trucks, and other vehicles, plus large numbers of personnel, and the commander must at all times be aware of their locations and needs. In addition to planning for the maneuver companies operating from BIFVs, he must plan for attached and subordinate units. The activities of the battalion antiarmor company and scouts must be monitored. The commander must also remain aware of the vulnerabilities and positioning of the combat support and combat service support units and trains. They must remain in a position of protection from possible hostile fire, but still close enough to the maneuver and combat elements to be able to perform their mission. Additionally, the battalion commander must be continuously aware of his main unit's position in relation to other elements or units to the flanks, rear or in forward positions. He must also be aware of his positions in relation to other units in the brigade.

Offensive and Defensive Operations

Another major task area for the battalion commander is in the area of fire support, for both offensive and defensive operations. The commander must, in concert with the brigade concept, plan with the Fire Support Coordinator for the operations of artillery, mortars and air support, and coordinate these fire plans with both higher headquarters and elements within his battalion. The commander must be aware of the wide frontages which must be covered by a Bradley battalion, and the speed with which individual squads,

platoons and companies can move within such an area. He must insure that friendly fires are not inadvertently called in on friendly vehicles and troops. The mobility of the Bradley and the necessity of having to plan for both mounted and dismounted troops makes fire support planning a difficult task for the commander.

The battalion commander must also plan battalion fires so that his entire area of responsibility is covered without being duplicative, and that obstacles and likely avenues of enemy approach are covered. Contingency plans for both direct and indirect fire support must be made, and the commander must be able to change his plans rapidly in accordance with the situation. In conjunction with his planning, he must be aware of the effective ranges of the weapons systems available to him, and plan to use them in the most efficient manner.

In offensive operations the commander must prepare his battalion to move to contact, and when in contact, to engage effectively and in a timely fashion. In a deliberate attack, he must insure that the battalion is coordinated on time and plans of operation, and he must insure that his troops move in correct formations to the correct positions. He is responsible for having planned appropriate techniques of fire and maneuver, and for insuring that his battalion is able to execute in a manner which will have the maximum effect. Similarly in hasty attacks, he must be able to insure that elements of his battalion will perform correctly.

Defensive operations also require proper planning and positioning, and assurance that elements of the battalion have alternate and supplementary positions in addition to well-prepared primary positions. Both hasty and deliberate defenses must utilize the maximum effective ranges of the weapons systems for the vehicles and the dismount elements, and the commander must have planned operations to maximize the effectiveness of his battalion in the overall mission. Counterattack planning and night and limited visibility operations also require detailed attention.

At all times and during all kinds of operations the commander must practice effective troopleading, whether in respect to his staff or to subordinate or attached commanders. He must oversee his staff planning, and know how to utilize the information provided to him. His command and control techniques must insure precision timing, and appropriate action. He must insure that his battalion is able to develop a situation and choose the appropriate course of action; he must then be able to report to higher headquarters in an efficient and timely fashion.

NBC and Directed Energy Threat

Another area of concern for the Bradley battalion commander includes all aspects of NBC warfare. Through the intelligence officer, the commander must insure that his battalion remains in the proper mission oriented protected posture (MOPP) to insure its survival. All members of the command must be aware of steps to be taken to protect both the BIFV and its occupants in the event of NBC activity. Since the Bradley does not have an overpressurization

system and is therefore not air tight, commanders must prepare for closed hatch operations. This is even more important considering that BIFV commanders at all levels tend to operate from open hatch positions because of the increased visibility gained therefrom. Similarly, the battalion commander must be aware of the potential danger presented by directed energy weapons, and by enemy use of smoke. The Bradley, despite its sophisticated sighting system, is vulnerable to these degradations and the commander must be sure that his battalion is prepared to minimize or overcome their effects.

Battalion Communications

The Bradley battalion commander must in many instances rely on fragmentary orders (FRAGOs) to convey information to subordinates; the continuous updating of reports from his staff on administrative, logistic and intelligence information may produce need for similar changes in orders to subordinates. Similarly, if a change in the battalion mission or in the focus within a mission is forwarded from brigade level, the battalion commander must be ready to change his plans in a timely fashion, and quickly pass the information to his subordinates. The Bradley commander must be flexible, and ready to change operations in a manner which provides maximum information to others.

The commander must also be aware of changes in the operations of the communications network and be cognizant of enemy activities in the areas of command and signal and jamming. The functions of the medical platoon must be monitored through the appropriate staff elements, to insure maximum combat effectiveness of each element of the battalion. The logistical and maintenance areas must be monitored to insure that the service support elements of the battalion are neither compromised nor left behind.

At the same time as the battalion commander is capitalizing on the great firepower and mobility of the BIFV, he must be aware of the limitations presented by the vehicle and its accompanying dismount element, and take these limitations into consideration in his planning. The relatively small amount of ammunition carried by each vehicle, and the need for refueling must be balanced against the available vehicle speed. The necessity for dismounting troops for local security and clearing operations and dismounted fighting must be balanced against the time required to remount them. The battalion commander must insure that the dismount elements and all their equipment and weapons have been given sufficient time to be safely remounted in their vehicles at the conclusion of operations before the vehicles are again called upon to move.

Conclusions

Training device requirements for the battalion commander tend to parallel those for the company commander in the Bradley-specific skills required of a Bradley commander at any level. It is imperative that the Bradley battalion commander be aware of the strengths, weaknesses, and capabilities of his Bradley equipped battalion. The commander must know the operational capabilities of the BIFV, and must be aware of the time requirements for such tasks

as ammunition loading, dismount operations, and preventive maintenance checks.
The commander must know what the vehicle cannot do, as well as what it
can do, to be able to plan effectively for its maximum use. To this end, he
must have a working knowledge of the vehicle.

In order to be able to prepare a concept of operations and to maintain
control of the battalion, the commander must be knowledgeable about the duties
of his staff and subordinates, to be able to determine the sources from which
he must draw information. The specific details of staff positions change with
a Bradley battalion, but in all probability, the individual who has attained
the position of battalion commander has held at least one of the staff duty
positions at company and battalion level, and has become familiar with the
activities of the others.

The areas of most concern to the battalion commander are those which call
for the integration of the activities of the combat elements, the support
elements and subordinate and attached units. Therefore, the battalion commander
must have the opportunity to exercise all the skills and relationships of his
staff, special staff, supporting and supported units to create a team approach
to tactical operations. The training required for attainment of command and
control skills and the troop leading procedures is the same as that needed at
any battalion level command.

Training to develop a coordinated, integrated and effective staff requires
interaction among staff members, and with battalion and subordinate unit
commanders. The command post exercise, or a device which simulates the
actions of higher and lower combat, combat support and combat service support
commands, is therefore critical to staff skill development.

To a great extent, then, the training needed by a Bradley battalion
commander is not Bradley-specific; the tasks are those which are covered in
the advanced officers courses, precommand courses and at the Command and
General Staff College. Any training devices which are applicable in training
those skills apply to Bradley commander training; details which are Bradley
specific must be learned deliberately and separately, with particular atten-
tion to the skills that are required of the subordinate commanders.

TRAINING DEVICES AND BRADLEY LEADER TASKS

Overview

The commander of a Bradley Infantry Fighting Vehicle, at squad, platoon, company or battalion level must perform a number of tasks which are critical to survival or mission accomplishment. Some of the tasks are Bradley-specific, and must be performed because of the characteristics and capabilities of the vehicle itself. Although these tasks have counterparts in tasks which must be performed by leaders in other vehicles, they are unique to the Bradley and deal with operations and techniques which must be performed to insure effective employment of a BIFV. Most of these Bradley related tasks have to do with the BIFV weapon systems, reloading, preventive maintenance and inspections, and with the SOPs developed to cover combat operations.

The other major important tasks required of the Bradley leader are similar to those performed in any combat leadership role; they differ only in degree or specific technique for the Bradley. The specific tasks involved in planning or carrying out a hasty attack or a deliberate defense are of major concern to Bradley leaders, but to no greater a degree than to leaders in other types of vehicle. Troop leading in the Bradley battalion is similar to troop leading in a M113 battalion; the techniques of employment which are different are those which are based on the capabilities and constraints of the vehicle itself.

As previously noted, perception of task criticality, difficulty or importance varies according to the authority level and experience of the responder, and the perceived decision making status of the individual or duty position involved. In the data reported earlier, the squad leaders interviewed on their assessments of criticality showed overwhelming concern with the operational tasks of the vehicle: the mechanical operations, movement, the preventive maintenance checks, and the gunnery related tasks. The platoon leaders were concerned with those same areas but also considered and focused on control of the dismount element, and conduct of the detailed and often complicated aspects of reorganization. The company commanders responded to the demands of the larger tactical situation rather than to the more elementary tasks. They focused on the elments of offense and defense, and the complex retrograde operations, showing much less concern with individual vehicle operation, maintenance, and gunnery.

Training Devices

The preceding general comments summarize the results of the background analysis for recommendations for training device support for the Bradley leader. A number of tables or matrices have been created to show the inter-relationships between Bradley tasks and the available and potentially available BIFV training devices. These tables will be discussed in detail in the following sections. (Appendix C presents fuller and more extensive information on these and other gunnery and tactical training devices and training aids and Appendix G describes an unsuccessful attempt to apply a computer based analysis to this data.)

There are presently available for the BIFV only a few training devices, although several existing devices designed for other purposes could in the future be adapted to training for the BIFV. Generally, however, the only devices which have immediate potential for BIFV adaptation are similar to some of those which are already in existence. Additionally, the existing devices tend to be those designed to train gunnery skills and are, at this point, still only prototype models which have had little or no field testing.

For already fielded devices, discussion will focus on a specific group of five training devices which have been developed for or adapted to the Bradley, with the explicit understanding that they are representative of generic classes of devices. The other available training devices and part-task devices can be clustered into or considered a part of these five classes, and will therefore not be treated separately. The devices discussed will be limited to those in the following categories:

SUBCAL. The Subcaliber devices are used to provide gunnery training which replicates as nearly as possible the firing of the main gun of the Bradley. The Brewster Device and Fiaoni Adapter are tank appended devices which are used with the BIFV Reavis Device and the Payne Harness to permit subcaliber firing from the BIFV. These devices permit firing of 5.56 or .22 caliber ammunition with a M16 rifle with the rimfire adapter; they also permit firing of the M55 laser. Subcaliber devices also imply the potential use of scaled targets and scaled ranges, and with the laser, the use of the Stout Board and various tracking devices. The Telfare, Wallace and Magee Devices for tanks are similar in purpose but unsuitable for the Bradley.

BGMTS. The Bradley Gunnery Missile and Target System (BGMTS) represents a potential family of laser devices appended to the BIFV gun barrel. BGMTS utilizes a visually realistic preplanned scenario, through a 35mm film presentation. The filmed scenarios can be changed as necessary, or slide presentations can be used. Firing of the 25mm gun, the coax, and the TOW missile system can be simulated. The BGMTS requires a stationary vehicle, and is suitable for use inside a relatively small facility. An eye-safe laser is used for firing, and all the basic gunnery tasks of the BIFV gunner and commander can be practiced during use of the BGMTS.

VIGS. The Videodisc Interactive Gunnery Simulator (VIGS) represents the currently available family of interactive part-task gunnery trainers. VIGS partially simulates the controls of a vehicle and presents a realistic visual scenario through videodisc technology. Computer based, VIGS provides one station gunnery training at a relatively low cost. VIGS specifically refers to the capabilities of the Perceptronics M2/M3 Trainer, but is similar to the Israeli TANGA Gunnery Trainer. VIGS permits simulation of firing of the 25mm, the coax and the TOW missile system.

PGS. The precision gunnery simulator (PGS) device category includes several potentially available precision lasers which use the actual vehicle, permit movement and multiple target engagement, and may be used for force-on-force training. An example of this category is the SAAB precision laser which was tested as a part of the Tank Weapons Gunnery Simulation System (TWGSS) with the Laser Target Interface Device (LTID) and has been further developed

to be used with the BIFV. The SAAB BT 41 is primarily a gunnery trainer, but could be used in a tactical mode. Also included as precision lasers are the Talissi device and the Simfire, not yet adapted to the BIFV but available for tank training.

COFT. The Unit Conduct of Fire Trainer (U-COFT) presents computer generated graphic displays for gunnery training. The COFT replicates the entire interior turret of the Bradley, and permits most of the normal vehicle functions. It presents a large array of varying scenes and targets for each of the three major weapons systems, and takes the gunner and commander trainees through a series of progressively more difficult scenarios. The COFT represents state-of-the-art simulation of gunnery training, and permits simultaneous scoring on a large number of performance dimensions. The U-COFT will be fielded to units in early 1985, and institutional models designed to instruct four pairs of turret crews simultaneously (I-COFT) will be available later.

In addition to the already developed devices which have been specifically adapted for Bradley training there are several potentially available devices or aids. There are three major additional types which may have applications for Bradley training. These devices or trainers are either already in the development stages, or could be developed in the near future because they employ technology similar to that of already fielded devices. These devices fall into the following general areas:

TACMASS. The Tactical Maneuver Simulation System (TACMASS) represents the major area of computer based tactical simulations. This also includes the efforts represented by SIMNET, INTSIM, SIMCAT, COLTSIM, and LSS, and is used to indicate the entire family of computer based devices which may be designed to permit mechanized operations at platoon level and higher through computerized movement over a simulated battlefield. This family of devices simulates the operation of multiple vehicles in varying tactical scenarios, and offers training of a number of skills at the same time, and over different levels of participation. TACMASS is still in an early stage of development but since it is based on an already fielded concept and utilizes existing devices, it will be available in the relatively near future to train multiple crews in tactical tasks for the BIFV as well as other mechanized units. Another potential useful device, the Company Team Level Tactical Simulation System (COLTSIM) is projected for early 1991 and will encompass most of the BIFV leader tactical tasks. Other device concepts such as SIMCAT and SIMNET represent lesser and greater degrees of computer involvement. Initial efforts focus on tank employment, but adaptations for the BIFV will be available.

GAMES. The category represented by GAMES can range from relatively simple board or terrain board games with rules of varying complexity (Dunn Kempf and First Battle Battalion-Corps) to the extremely complex computerized battalion level games (ARTBASS, CAMMS). These games, already in existence, may require major modifications to insure suitability for play by Bradley commanders. Games are particularly valuable as training aids because they often include provision for teaching or reinforcing many of the combat support functions required of a leader at company or higher level. There are presently a very large number of battle or war games, most of which could be fairly readily adapted to accommodate the specific information and skills required by addition of the Bradley.

EIDS. The Electronic Instructional Delivery System (EIDS) represents the interactive videodisc microcomputer system which is to be adopted by the Army in the very near future. The EIDS system can be utilized for many different kinds of training, and could be specifically adapted to meet the needs of Bradley tactical training. Like the VIGS, the EIDS is an interactive system and scenarios are limited only by the number of discs available. Unlike the gunnery trainer, an EIDS trainer would not necessarily need to simulate the BIFV turret controls. EIDS could be used to simulate dangerous or highly complicated leadership or equipment specific situations which are not practical to duplicate in the live training environment. The EIDS portability and potential for standardization makes it a potentially useful device for both institutional and unit training.

A brief summary of the eight categories of training device support available or potentially available for the Bradley is presented at Table 10.

Table 10

Bradley Training Devices

Device	Characteristics
SUBCAL.	vehicle and subcaliber ammunition or laser
BGMTS	vehicle and laser and film
VIGS.	simulator and interactive videodisc
PGS	vehicle and precision laser
COFT.	simulator and computer generated graphics
TACMASS	simulation through large scale computer
GAMES	computer or board game scenarios
EIDS.	simulation through videodisc technology

Relationship Between Devices and Bradley Tasks

Table 11 describes some of the major characteristics of these eight training device areas in relation to each other and in relation to Bradley training. Included in Table 11 are those characteristics which are most relevant in contemplation of the relative degree to which a training device meets the needs of a system.

Training considerations such as method of feedback are important variables in choosing between training devices. Devices which provide copies of training records may be more useful in some situations than devices which provide only oral instructor feedback or critique. The COFT, for example, provides three kinds of feedback, while VIGS has only two. Games can provide varying methods of feedback, depending on their complexity and sophistication. The potential for addition of a photographic type record by use of the through-sight-video camera device adds to the value of a training device by providing a relatively permanent visual record of the training situation.

Another consideration is length of time required to learn to operate the device. A training device which is complex to utilize or administer will be suitable for different situations than will a simple one that requires little training for operator or trainee. Increasingly complex devices also tend to be more costly than simpler ones.

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Table 11

Relationship of Training Device Characteristics to Selected Training Devices

Characteristics	Training Device Categories							
	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
PARTICIPANTS								
Gunner only			x					o
Gunner & commander	x	x		x	x		o	o
Driver, gunner, commander					o		o	o
Full crew (squad)						o	o	o
Platoon				o	o	x	o	o
Company & higher					o	x	o	o
VEHICLE/SUPPORT REQUIREMENTS								
Uses BIFV	x	x		x				
Simulates BIFV			x		x	x		o
Vehicle motion				x	x	x		o
Permanent location		x			x	x	o	
Moveable	x		x	x			o	o
Can be used outdoors	x		o	x			o	o
Requires power source		x	x		x	x	o	x
SPECIAL EFFECTS								
Permits force-on-force (OPFOR) tng				o		x	o	o
Weather effects	o	o	o	o	o	o	o	o
Limited visibility operations	x	o	o	x	x	x	o	o
Use of night vision devices	o	o		o				
NBC firing (MOPP gear)	x	x	o	x	x	o		o
Visual realism	x	x	x	x				o
Auditory realism	o	x	o	x	x	x	o	o
TRAINING CONSIDERATIONS								
Feedback from instructor/peer	x	x	x	x	x	x	o	o
Feedback visual display		x	x	x	x	x	o	x
Feedback print		o		x	x	x	o	o
Through sight video attachable	o	o		o				
Variable difficulty level	x	x	o	x	x	x	o	o
Instructor tng time length-hi, med, low	L	M	L	M	H	H	all	M
Trainee tng time length- hi, med, low	L	L	L	L	H	H	all	L
Training: intial, sustainment	both	both	both	both	S	S	S	both
Training site: institution or unit	both	both	both	both	both	U	both	both

Note. X indicates that the device as presently configured exhibits this
characteristic
O indicates that the device could be developed or modified to exhibit
this chacteristic

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Similarly, the level of participation built into the device impacts on choice of alternatives. A device which trains only the gunner (individual skills) may not be as useful as one which trains both the gunner and commander (crew and interactive skills). Also, for some task areas, platoon or company level trainers (multiple crews) may offer greater training benefits than single vehicle stations.

A further consideration is that of the relative movement capability of the training device. Devices that cannot be readily moved from one location to another require different kinds of training planning than do those which can be conveniently transported by an individual.

Another difference between potentially useable devices centers on whether the device employs either a moving or a stationary Bradley or whether it does not use the vehicle at all and is a self-contained simulator. The ability to tolerate or simulate changing weather and visibility conditions impacts on selection and placement of a training device. Also important is the requirement for a stable power source. All of these and other considerations are reflected in Table 11.

Table 12 provides an overview of the task and procedure areas faced by a Bradley leader, with special focus on the gunnery and pregunnery aspects of Bradley employment and their relationship to the eight categories of training devices. Tactical operations are covered, but not in the same detail as gunnery skills because the purpose of this table is to show the adequacy of coverage of gunnery skills in the pool of available and potencially available Bradley training devices. The major Bradley task areas shown in this table are a composite of the master list of BIFV leader tasks, and the 11M Fighting Vehicle Infantryman Soldier's Manual Tasks.

It is apparent that the available prototype devices fairly adequately cover the gunnery skills needed by the Bradley leader. However, none of the training devices covers the tasks of ammunition loading and treating major weapon system malfunctions. The reason the devices cannot cover these tasks is that full caliber ammunition is not used in any of these devices and the weapon is therefore not uploaded. Similarly, treating gun malfunctions cannot adequately be trained without actual use of the gun in its designated role. With these exceptions, however, gunnery tasks are covered by combinations of subcaliber devices, BGMTS, VIGS, the PGS, and the COFT. Each device varies slightly in its capabilities, although there are many tasks which all train. The three other potential training device categories offer some, although less, coverage of gunner tasks.

While the three potential device categories (TACMASS, GAMES and EIDS) add little to training in the areas of gunnery skills and target engagement they show positive contributions in tactical operations as shown in Table 12. TACMASS-like simulations are designed to cover tactical operations including offensive and defensive maneuvers; similarly, games focus on these kinds of activities. Development of an EIDS interactive videodisc program for tactics could encompass these BIFV tactical areas. The precision gunnery system, although not designed as a tactical trainer, could be used in a tactical force-on-force setting if several vehicles are equipped with laser sensors.

Table 12

Relationship Between BIFV Tasks and Procedures and Potential Training Device Coverage

Tasks	Training Device Categories							
	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
*Operate intercom	/	/		/	/	/		o
*Drive BIFV/drive at night				/				
*Start/stop engine	/	/		/				
*Start engine auxilary power	/	/						
*Shut down BIFV	/	/						
*Break/join track	/	/						
*Operate in water								
*Tow/tow start				/				
*Extinguish fire	/	/		/				
*PMCS hull	/	/		/				
*PMCS turret	/	/		/	o			
Perform assembly area operations	/	/		/		o	o	o
*Supervise combat loading							o	o
*Install/remove FPW	o	o		o				
*Operator maint FPW	o	o		o				
*Operator maint coax	/	/		/				
*Operator maint 25mm	/	/		/				
*Operator maint TOW	/	/		/				
*Load/unload clear FPW	o	o		o				
*Load/unload clear coax								
*Load/unload ready boxes 25mm								
*Load/unload clear 25mm feeder								
*Load/unload TOW launcher	o	o		o				
*Perform misfire procedures FPW	o	o		o				
*Perform misfire procedures coax								
*Perform misfire procedures 25mm								
*Remove misfired TOW Missile	o	o		o				
*Load/unload stow smoke grenades	o	o		o				

Note. An asterisk * preceding a task indicates that the task is an 11M Fighting Vehicle Infantryman Soldier's Manual Task.

x indicates that the device has been (or will be) developed to train or reinforce this task.

/ indicates that although the device was not developed to train or reinforce this task, it can be performed or evaluated while the device is being used.

o indicates that the device could be developed to train or reinforce this task, or that an existing device could be modified to train or reinforce this task.

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Table 12

Relationship Between BIFV Tasks and Procedures and Potential Training Device Coverage

Tasks	Training Device Categories							
	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
*Remove misfired smoke grenade	o	o		o				
*Boresight/zero day sight ISU	x	x		x	x	o		o
*Boresight/zero thermal sight ISU	x	o		x	x	o		o
*Boresight backup sight	o	o		o	o	o		o
Operate in power mode	x	x	x	x	x	x		
Operate in manual mode	x	x		x	x	x		
Acquire targets	x	x	x	x	x	x	o	o
Identify targets friend or foe	x	x	x	x	x	x	o	o
Classify targets on priority	x	x	x	x	x	x	o	o
*Issue initial fire commands	x	x		x	x	x	o	o
Issue subsequent fire commands	x	x		x	x	x	o	o
Estimate range	x	x	x	x	x	x	o	o
Manipulate - lay gun	x	x	x	x	x	x		o
Track - moving target	x	x	x	x	x	x		o
Hand off from BC to gunner	x	x		x	x	x		
Index range	x	x	x	x	x	x		o
Change magnification	x	x	x	x	x			
Select ammunition	x	x	x	x	x	x	o	o
*Engage targets with 25mm		x	x	x	x	x	o	o
*Engage targets with coax	o	x	x	x	x	x	o	o
*Engage targets with TOW		x	x	x	x	x	o	o
*Engage targets with FPWs						o	o	o
*Engage targets with backup sight	o	o		o	o	o		
*Fire smoke grenades				o	x	x	o	o
Use precision gunnery	x	x	x	x	x	x	o	o
Use battlesight gunnery	x	x	x	x	x	x	o	o
Engage single targets	x	x	x	x	x	x	o	o
Engage multiple targets	x	x	x	x	x	x	o	o
Engage stationary targets	x	x	x	x	x	x	o	o
Engage moving targets	x	x	x	x	x	x	o	o
Apply lead	x	x	x	x	x	x	o	o
Observe tracer flight	x	x	x	x	x	x		o
Adjust fire BOT	x	x	x	x	x	x		o
Change burst size	x	x	x	x	x	x		o
Observe weapon effects	x	x	x	x	x	x	o	o
Fire from commander's position	x	x		x	x	x	o	o
*React to antiarmor fire		o	o	/	x	x	o	o

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Table 12

Relationship Between BIFV Tasks and Procedures and Potential Training Device Coverage (continued)

Tasks	SUBCAL	BGNTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
						Training Device Categories		
Insure operational security						o	o	
*Consolidate				/		x	o	o
*Reorganize				/		x	o	o
*Secure a building with M2 squad						o	o	o
*Conduct defensive MOUT				/		o	o	o
*Control movement through urban terrain				/		o	o	o
*Organize antiarmor ambush				/		x	o	o
*Conduct antiarmor ambush				/		x	o	o
*Control mounted platoon formations				/		x	o	o
*Control dismounted platoon formations				o		x	o	o
*Direct a dismount				o		x	o	o
*Control dismount team movement				o		x	o	o
*Direct dismount team movement				o		x	o	o
*Move as a member of a dismount team								o
*Direct fire & maneuver of dismount tm				o		x	o	o
*Direct fire & maneuver of BIFV pltn				o		x	o	o
*React to direct fire		o		o	o	x	o	o
React to indirect fire				o		x	o	o
*Plan movement to contact			\	/		x	o	o
*Conduct movement to contact				/		x	o	o
*Conduct mounted assault				/		x	o	o
*Conduct dismounted assault						x	o	o
Conduct hasty attack				/	o	x	o	o
Conduct deliberate attack				/		x	o	o
*Prepare a range card	/			/		/	o	o
*Direct dismount team fires in defense				o		x	o	o
*Direct platoon fires in defense				o		x	o	o
*Prepare squad defensive position				o		x	o	o
*Prepare platoon defensive position				o		x	o	o
*Employ BIFV platoon on battle positions				o		x	o	o
*Employ BIFV in air defense (helicopter)			/	/	x	x	o	o
Conduct hasty defense				/	o	x	o	o
Conduct deliberate defense				/		x	o	o
*Conduct a disengagement				/		x	o	o
Conduct retrograde operations				/		x	o	o
Report to higher HQ	o	o		o	o	x	o	o
Conduct combined arms operations				/		x	o	o

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The device cannot measure performance of the tactical skills, but they can be practiced while the PGS is being used for its main purpose. A further area of tactical operations concerns the activities of the BIFV dismount team. Only the TACMASS trainer is specifically designed to include dismounted operations; however, games and the EIDS system could be designed to cover the activities of the dismount team, and the PGS system could be modified to include a dismount element which could perform at the same time as the gunnery element.

The next three tables, Tables 13, 14, and 15, match the same set of eight training devices against the critical task lists obtained from the rating and analysis processes described earlier in this report. The squad, platoon and company commander's lists reflected in these tables have been slightly consolidated to reduce redundancy, but they generally parallel Tables 2, 6, and 8 found in the sections on squad leader, platoon leader, and company commander tasks. Again, it is readily apparent that although the gunnery related skills are adequately covered by the existing training devices, tactical operations and skills that are based on decision making and leadership skills are much less well covered. The devices that have not yet been fielded (TACMASS, GAMES or EIDS) offer some potential for coverage of the leadership skills and the tasks that are applicable on the company and battalion level, but only EIDS offers coverage of the tasks appropriate for the squad and platoon leader.

Squad Leader Task Coverage

Table 13, Squad Leader Tasks, shows that very few of the tasks perceived as critical by the raters are covered by the currently available devices, SUBCAL, BGMTS, VIGS, PGS or COFT. The squad leaders' highest rated three tasks are concerned with movement of the BIFV. However, no existing training devices cover the elements of safe driving (speed, distance, intervisibility) or terrain driving (avoiding crests, staying close to cover, concealment and camouflage) and none offer any potential for training in practicing security during movement. Although not designed to teach movement techniques, the PGS does permit movement, and as such, can offer potential for evaluation of movement techniques. TACMASS and GAMES could evaluate movement, although it is unlikely that either will focus on squad leader level performance; EIDS could be designed to reinforce movement techniques in surrogate travel.

Similarly, none of the training devices is intended to teach or evaluate the assembly area activities of position selection, PMCS, precombat inspections, reconnaissance and security. Additionally, some of the tasks in reorganization which were rated high for the squad leaders cover post operation PMCS and troubleshooting and there are no training devices to cover these tasks. None of these areas would be likely to be covered by GAMES, and TACMASS will not focus on individual squad operational tasks; EIDS could respond to some of these task areas.

The available gunnery devices reinforce training in fire commands, fire control, distribution and concentration of fire, and use of the effective range of weapons, but provide no way to train activities involving the dismount element. Although the opportunity to practice reaction to NBC

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Table 13

Relationship Between Squad Leader's Task List and Potential Training Devices

Squad Leaders Task List	Training Device Categories							
	SUBCAL	BGNTS	VIGS	PGS	COFT	TACNASS	GAMES	EIDS
Supervise terrain driving				/				o
Maintain security during movement				/				o
Supervise safe driving				/				o
Assign assembly area positions				/				o
Perform PMCS	/	/		/	o			
Precombat inspections	/	/		/				
Reorganization								o
Use fire commands	x	x	o	x	x			o
Reconnaissance of assembly area				/			o	o
Fire distribution and control	x	x	x	x	x			o
Attack				/	x		o	o
Reach objective				/			o	o
Consolidate				/			o	o
Specify distribution/concentration fire	x	x	x	x	x		o	o
React to chemical threat				o			o	o
Assign vehicle position/dismount				o			o	o
Set SOP for exit dismount				o				o
React to air attack				o	x		o	o
Suppress ATGM		o		o	o		o	o
Establish security				/				o
React to weapon malfunction/25								
React to veh emergency/ISU, elect, susp	/	/		/				
Establish assemby area security				/			o	o
Use effective range weapons	x	x	x	x	x		o	o
Maintain MOPP	/	/	/	/	o			o
Exit & remount dismount team				o			o	o
React to nuclear threat				o			o	o
OPORD make plan				o			o	o

Note. x indicates that the device has been (or will be) developed
to train or reinforce this task.

/ indicates that although the device was not developed to train
or reinforce this task, it can be performed or evaluated while
the device is being used.

o indicates that the device could be developed to train or
reinforce this task, or that an existing device could be modified
to train or reinforce this task.

conditions may come in an Army Training and Evaluation Program (ARTEP), no BIFV devices specifically reinforce this training. MOPP gear can be worn with several available devices, but the training is only incidental.

As noted earlier, reactions to emergencies in the weapon systems or the vehicle itself are not taught or reinforced by devices. Training is done on a hands-on basis for the weapon systems, and if practiced at all, by hands-on practice in reacting to emergencies such as fire, suspension system failure, and electrical failure. As previously noted, none of these areas is suitable for simulation; training can best be effected by use of the actual vehicle and operation of its systems.

Projected devices or potential changes to the existing devices may be useful in covering some of the non-gunnery tasks areas which are of importance to the squad leader. None of the tasks faced by the BIFV squad leader is intrinsically difficult. However, for the squad leader, the most important aspects of training come from the integration of the separate skills into a smooth and effective pattern of behavior. The combination of tasks, and the speed and precision with which they must be performed in a combat environment makes them difficult for the squad leader to learn and perform.

The responsibilities presented by the complicated vehicle and the presence of a dismount team make the job of BIFV squad leader more difficult than would be expected. Therefore, any device which is used to train squad leaders in performance of their non-gunnery related tasks must be one which will provide for a replication of the complexity of multiple task integration and quick decision making. The device must represent the complexity provided by the combination of responsibility for a vehicle and weapons, and responsibility for decision making regarding a dismount element. The large scale computer simulations (like TACMASS) are not designed to cover the performance of individual squads, but to cover platoon performance; GAMES also tend to focus on, at the very least, platoon and higher performance. Since it is limited in scope only by the content of the scenarios written for it, an EIDS approach may be useful in training the BIFV squad leader.

Platoon Leader Task Coverage

Table 14, covering Platoon Leader tasks, shows that few tasks important to the platoon leader are covered by the gunnery training devices which are presently available for the BIFV. The tasks performed in an assembly area setting (inspections, combat load, position assignment, PMCS) are not covered by training devices. Since the platoon leader is responsible for the operations of three vehicles in addition to his own, he is concerned with their readiness. Although the platoon sergeant traditionally relieves the platoon leader of some of his responsibilities in this area, the platoon leader raters indicated their concerns for these tasks by high ratings. Similarly, the elements of reorganization, redistribution, and the resupply of ammunition for weapons, fuel for vehicles and the redistribution of supplies and personnel were rated high by this group of raters. These task areas, and the decision making required by them, are not covered in any existing training devices. The TACMASS type simulations will treat these tasks to some extent; similarly, GAMES tend to include logistic and resupply operations.

Table 14

Relationship Between Platoon Leader's Task List and Potential Training Devices

	Training Device Categories							
Platoon Leaders Task List	SUBCAL	BGNTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
Precombat inspections-weapons				/				
Deploy dismount team				o		x	o	o
Direct fire/specify weapons				o		x	o	o
Maintain security during movement				/		o	o	o
Assign vehicle position/dismount				o		x	o	o
React to directed energy weapons				o		o	o	o
Fire distribution and control				o		x	o	o
Reorganize						x	o	o
Perform PMCS				/				
Fire support/obstacle coverage						x	o	o
Precombat inspections-vehicle				/				
Combat load								
Perform detachment left in contact (DLIC)						o	o	o
Maintain communications/dismount				o		x	o	o
Practice battledrills				/		o		
Provide covering force/dismount				o		x	o	o
Exit/remount personnel & equipment				o		x	o	
Reconnaissance assembly area				/		o	o	o
Supervise terrain driving	`			o		x		o
React to direct/indirect fire				/		x	o	o
Return fire with appropriate weapons				/		x	o	o
Suppress ATGM				o		x	o	o
Assign targets and priorities				/		x	o	o
React to vehicle emergency				/				
Take action on contact				/		x	o	o
Call for indirect fire support				o		x	o	o
Consolidate				/		x	o	o
Plan supporting fires				o		o	o	o

Note. x indicates that the device has been (or will be) developed to train or reinforce this task at this level.

/ indicates that although the device was not developed to train or reinforce this task, it can be performed or evaluated while the device is being used.

o indicates that the device could be developed to train or reinforce this task, or that an existing device could be modified to train or reinforce this task.

Table 14

Relationship Between Platoon Leader's Task List and Potential Training Devices (continued)

Platoon Leaders Task List	Training Device Categories							
	SUBCAL	BGNTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
React to nuclear threat				o		o	o	o
React to air attack						x	o	o
Assign assembly area positions				/		x	o	o
Use fire commands				o		x	o	o
Use effective range weapons				o		x	o	o
Supervise movement to contact				/		x	o	o
Attack				/		x	o	o
Assign sectors/targets for dismount				o		x	o	o
Maintain security						o	o	o
Occupy defensive positions				/		x	o	o
Identify enemy avenues of approach				/		x	o	o
Prepare alternate supply positions				/		x	o	o
Make range cards/sector sketches				/		o	o	
Defend vs long range targets				/		x	o	o

The activities of the dismount element were of great importance to the platoon leaders, particularly because of the increased responsibilities brought about by the simultaneous management of both the dismount platoon fires and the mounted fires. Again, no existing device offers training or reinforcement in these platoon leader task areas. The TACMASS simulation is planned to cover the activities of the dismount element, and GAMES or EIDS can also include provision for dismounted troops. The PGS can permit dismount activity although currently does not offer any capability for measuring performance in these areas.

Although the gunnery-related tasks (fire control, fire commands, effective range) are covered by the available devices, there are no opportunities for the platoon leader to practice assigning targets and priorities within the platoon fire plan, or to oversee preparation of range cards and platoon or sector sketches. Since BIFV companies will be fighting as platoons more often than as individual squads, the platoon leader needs to be able to practice integrating the fires of his whole platoon. Simulations and games may offer these opportunites; and EIDS approach could also teach these skills.

The platoon leader has no device to assist him in learning about defensive operations. He has little opportunity to practice decisions about assignment of sectors or coverage of obstacles, nor does he get practice in planning for and calling for direct and indirect fire support. No devices offer practice in selection of defensive positions, or supplementary or alternative positions, or in identifying likely enemy avenues of approach. Similarly, in the offense, trainers offer little concerning movement to contact, taking action on contact, reaching an objective, consolidation or reorganization. Devices presently available do not offer training on providing a covering force for the dismount element, nor do they offer guidance on direction of any of the operations of the dismount element. All of these operations will be covered to some degree in the large scale tactical simulations, and can be included in any games designed for platoon level leaders.

Thus a large number of tasks facing the platoon leader not yet covered by the existing devices will be trained in the TACMASS and COLTSIM large scale simulations which will cover all the major aspects of offensive and defensive tactics and techniques. Similarly, a large number of the platoon tasks can be practiced during ARTEPS using MILES equipment or in tactical exercises without troops (TEWTS). Games could be developed to insure practice for platoon leaders in decision making skills with BIFV scenarios, and EIDS training would supplement both games and the large scale simulation.

The platoon leader must be able to perform all of the same tasks which the squad leader performs, with the addition of the platoon responsibilities inherent in a tour vehicle situation. The trainer for a platoon leader must take into consideration the specific Bradley skills needed, as well as the decision making and troop leading skills needed; similarly, the platoon trainer must be a device that integrates a large number of relatively uncomplicated tasks into a very complex whole, and presents them in a meaningful way to an individual who has only very limited experience.

Company Commander Task Coverage

Table 15, covering the Company Commander's task list, is similar to Table 14. The operations, tactics and techniques which are most critical to the company commander are covered only during MILES exercises and not by the available devices, although games offer a good arena for command level task performance. The same gunnery tasks of concern to the squad leaders and platoon leaders are important to the company commanders, and the gunnery devices can be employed to train them.

However, the aspects of direct and indirect fire support and coordination with the fire support team, are not addressed. Games can be adapted to include fire support activities, but it is difficult in a game to replicate the complexitities involved in fire support coverage presented by the combination of the BIFV and the dismount element. The TACMASS and large scale computer simulations will cover these kinds of tasks for the company commander.

Another large task area which was of particular concern to the company commander raters interviewed was that covering all of the elements of retrograde operations. Although GAMES may permit the planning of such operations, they cannot replicate the stress and emotional demands placed on the leader, nor can they adequately represent the need for instantaneous and accurate decision making in a withdrawal or a delay. The large scale simulations ought to offer the best coverage of these tasks in a training situation; EIDS may also offer potential for interactive coverage of some of these tasks.

The TACMASS large scale computer based simulation will help to train some of the tasks which are of importance to the BIFV company commander but are not yet reinforced by the existing devices. Since a large number of offensive and defensive mechanized operations will be covered by the TACMASS simulation, movements and communication functions will be addressed, and the company commander's extensive span of control can be simulated efficiently. Dismount activities will also be included to further enhance total company coverage. The commander at company level is generally concerned with the actions of more than one vehicle; therefore the techniques needed to coordinate the fires and movement of his three platoons will be specifically addressed by this large scale effort. The logistical tasks faced by the company commander (and perhaps underestimated by the raters here) will be covered to some extent by the large scale simulations; there are also games available which focus on service support and combat service support areas. Finally, to the extent that the company commander must be aware of all of the tasks facing the platoon and squad leader, any device that is appropriate for them is also useful at his level.

Battalion Commander Task Coverage

As has been previously noted, the battalion commander's task areas tend to be the same as those of the company commander. Therefore, comments about company commander task coverage are also relevant to the battalion commander. The activities of the battalion staff which are of great importance to the

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Table 15

Relationship Between Company Commander's Task List and Potential Training Devices

Company Commanders Task List	SUBCAL	BGNTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
					Training Device Categories			
Use effective range weapons						x	o	
React to weapon malfunction								
Use fire control measures						x	o	
Use patterns of fire						x		
Use fire commands						x	o	
Identify targets						x	o	
React to vehicle emergency								
Deploy dismount team						x	o	
Coordinate with FIST						x	o	
Call for indirect fire support						x	o	
Call for list/shift fires						x	o	
Take action on contact						x	o	
Attack						x	o	
Determine mounted/dismounted attack						x	o	
Call for direct fire support						x	o	
Conduct retrograde operations						x	o	
Maintain retrograde security						o	o	
Perform detachment left in contact (DLIC)						o	o	
Conduct retrograde movement						x	o	
Plan retrograde fire support						x	o	
Conduct delay, withdrawal, retirement						x	o	
Conduct the defense						x	o	
Assign defensive targets						x	o	
Defend against long range targets						x	o	
Defend against close in targets						x	o	
Specify distribution/concentration fire						x	o	
Assign area coverage/sectors						x	o	
Maintain turret orientation						/		
Specify ammo type						x	o	

Note. x indicates that the device has been (or will be) developed to train or reinforce this task.

/ indicates that although the device was not developed to train or reinforce this task, it can be performed or evaluated while the device is being used.

o indicates that the device could be developed to train or reinforce this task, or that an existing device could be modified to train or reinforce this task.

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Table 15

Relationship Between Company Commander's Task List and Potential Training Devices
(continued)

Company Commanders Task List	Training Devices Categories							
	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
Supervise movement to alt/sup positions						x	o	
Maintain fire distribution/control						x	o	
React to directed energy weapons						x	o	
Return fire with appropriate weaoons						x	o	
OPORD/restrictions on fire support						x	o	
React to direct/indirect fire						x	o	
Occupy defensive positions						x	o	
Coordinate fire support plan						x	o	
Report to higher headuarters						x	c	
Direct fire/specify weapons						x	o	
Assign targets & priorities						x	o	
Use smoke						x	o	
Use illumination plans/lim vis devices						x	o	
Assault line-location & signal						x	o	

battalion commander are covered by a combination of the games available for logistic and support functions, and by the activities encompassed in command post exercises. The battalion commander is not so concerned with practice of his individual skills and tasks, but must focus on the integration of all of his skills and those of his subordinates. He must practice decision making based on the information gained from the sources which have gathered it for him; the combination of skills is more important than the practice of any one.

TACMASS and the other large scale simulations will cover the battalion commander's tactical tasks; the game simulations will probably cover the necessary support element information. The areas most likely to be overlooked for the battalion commander are the simplest areas covering the capabilities and limitations of the BIFV, and the tasks which must be performed by the squad leader. The battalion commander must learn the tasks facing personnel at each level of control; only then will he be able to make his plans realistic, and command in a manner which exploits the maximum potential of the BIFV battalion.

Overall Task Coverage

The final table, Table 16, represents a summarization and compilation of the relationship between training device coverage and the critical task areas represented by the three separate lists from the squad leader, platoon leader and company commander. Some tasks from the previously described lists have been combined into more general or comprehensive areas where it was possible to do so without loss of the meaning of the task. This combination was in the direction of recombining subtasks into their major areas. Other tasks (mainly gunnery related) have been deleted if the previous analysis showed that they were fully covered by the five gunnery training device categories (SUBCAL, BCMTS, VIGS, PGS, COFT) now in existence.

The tasks which remain on the resulting list are those which are inadequately covered by the existing training devices. The list of tasks in Table 16 also indicates the few task areas which are covered within the resident instruction courses offered by the U.S. Army Infantry School and are therefore probably not in need of further training device support. These tasks, indicated by an asterisk immediately preceding the task name, are mainly vehicle and weapon related, covering inspections and operations, and tasks which can only be performed using the actual vehicle with its weapons systems intact. Included are tasks such as dealing with malfunctions and emergencies, and driving. The task area, make range cards/sector sketches, is covered in range estimation classes. Tasks involving suppression of an ATGM, or defense against long range targets are either explicit or implicit in live fire gunnery exercises, and are therefore also indicated as adequately covered.

Tasks Which Are Not Covered By Existing Devices

The remaining twenty-two tasks are those which have been rated as important or critical by this particular group of raters, but which have not been covered by the training devices which are now in existence and are not thoroughly

Table 16

Relationship Between BIFV Leaders' Tasks and Training Devices: Areas of Insufficient Coverage

Level			Task	SUBCAL	BCMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
s	p		Assign assembly area positions/recon					/		o	o
s	p		*Perform PMCS/precombat inspections	/	/			/			
	p		*Combat load								
s	p		*Supervise driving				/		x		o
s	p		Supervise movement to contact/security				/		x	o	o
		c	*Maintain turret orientations	/			/	/	/		o
s			*Maintain MOPP	/	/			/	o	o	
s	p	c	*React to weapon malfunction								
s	p	c	*React to vehicle emergency	/	/		/				
s	p	c	Establish security							o	o
	p		Practice battledrills					/		o	
	p	c	Take action on contact				/	o	x	o	o
		c	Report to higher headquarters	o	o		o	o	x	o	o
	p	c	React to direct/indirect fire		o		/	/	x	o	o
s	p	c	React to NBC, directed energy threat					o	o	o	o
s	p		React to air attack					o	x	o	o
s	p		*Suppress ATGM		o		o	o	x	o	o
	p	c	Return fire with appropriate weapons		o	o	/	/	x	o	o
		c	Use smoke				/	x	x	o	o
	p	c	Call for direct/indirect fire support					o		x	o	o

Note. * preceeding task name indicates that the task area is covered in one or more of the BIFV courses (the OSUT 11M BIFV add-on, or the BIFV Gunner, Commander or Master Gunner Course).

s indicates a task from the Squad Leader List; p from the Platoon Leader List; c from the Company Commander List.

x indicates that the device has been (or will be) developed to train or reinforce this task.

/ indicates that although the device was not developed to train or reinforce this task, it can be performed or evaluated while the device is being used.

o indicates that the device could be developed to train or reinforce this task, or that an existing device could be modified to train or reinforce this task.

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Table 16

Relationship Between BIFV Leaders' Tasks and Training Devices: Areas of Insufficient Coverage

				Training Device Categories							
level			Task	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
s		c	OPORD/plans/limvis				o		o	o	o
		c	Determine mounted/dismounted attack						x	o	o
s	p	c	Deploy/cover dismount				o		x	o	o
s	p	c	Attack				/	x	x	o	o
s	p		Reach objective/consolidate				/		x	o	o
	p	c	Primary/alt/suppl def positions				/		x	o	o
	p		Identify enemy avenues of approach				/		x	o	o
	p	c	Assign targets/priorities/sectors	/	o	o	/	o	x	o	o
	p		*Make range cards/sector sketches	/			/		o	o	o
	p	c	*Defend against long range targets				/	x	x	o	o
	p	c	Conduct retrograde operations/DLIC				/		x	o	o
s	p		Reorganization						x	o	o

Note. * preceeding task name indicates that the task area is covered in one or more of the BIFV courses (the OSUT 11M BIFV add-on, or the BIFV Gunner, Commander or Master Gunner Course).

s indicates a task from the Squad Leader List; p from the Platoon Leader List; c from the Company Commander List.

x indicates that the device has been (or will be) developed to train or reinforce this task.

/ indicates that although the device was not developed to train or reinforce this task, it can be performed or evaluated while the device is being used.

o indicates that the device could be developed to train or reinforce this task, or that an existing device could be modified to train or reinforce this task.

covered in the BIFV courses offered in the institutional setting. This list of tasks is not comprised of Bradley specific skills, but rather of the technqiues which the Bradley leader must employ in a tactical situation. Discussion of a few of these tasks will further explain this distinction.

Maintaining security is vital for the survival of any infantry platoon. However, the specific techniques which must be applied to insure security for a Bradley platoon are not the same as those applicable to other types of platoons. Decisions can and must be made about when to dismount troops for security, about the advisability of using the integrated sight unit as a security device, and about the use of troop compartment vision blocks. Even the choice of dismount weapons is different for the BIFV. There are at present no trainers which focus on these kinds of decisions, and the manner in which they must be implemented in the Bradley company or battalion.

Similarly, movement to contact is a task area which is common to all squads in a combat situation, and is an area whose content is covered in many ways in leadership courses. However, in addition to knowing the tactical requirements of a movement to contact, a Bradley platoon leader must be aware of the characteristics and capabilities of his BIFV platoon and its vehicles and dismount element. It is these specific characteristics that make movement to contact with a BIFV platoon different from movement with a M113 platoon, and it is these techniques that presently have no training device support.

Taking action on contact is a common infantry combat task, but the specific techniques change with the availability of a BIFV. Decisions must be made on the specific weapons to be used, on mounted or dismounted action, and on the relationship between the vehicle and the dismount team. Some aspects of reactions to direct and indirect fire and nuclear or chemical threats are infantry-wide survival reactions; others are vehicle related. The BIFV both limits and assists in these areas. For example, the BIFV's armor gives a false sense of security from some kinds of weapons; however it does provide cover from artillery, mortar and rocket indirect fires.

In any successful combat situation there must be evidence of fire planning, and assignment of coverage and priorities. The Bradley leader must be given the opportunity to learn how to combine the specific skills he knows about target engagement or offensive and defensive operations with the specific capabilities and limitations of the Bradley. With several weapon system options available, the Bradley leader must know when to employ each particular weapon system, and how to insure that his entire sector of responsibility is covered, without leaving either overcovered or uncovered areas. The concepts are not new, but the specific decision making processes and decisions about the appropriate techniques are dependent on knowledge of use of the Bradley vehicle.

In much the same manner, the other tasks which are found on the list in Table 16 can be shown to be tasks that are not new for any Bradley leader, but are those whose execution is in some way dependent on knowledge of the Bradley's characteristics. None of the present training devices covers these tasks. To some extent these tasks will be all covered by the large scale simulations. Additionally, they could be covered by a gaming situation,

either by simple board or terrain model games, or by the more sophisticated computer games. An EIDS approach could also cover most of the tasks if the appropriate scenarios were developed. However, at this point in time, these critical tasks are without adequate training device support.

Implications for Training Device Requirements

In summary, as is apparent from inspection of the training device and Bradley task matrixes represented by Tables 12 through 16, by the time the COFT has been fielded for unit and institutional training, gunnery skills will be covered adequately by training device support. The COFT in combination with the VIGS part task gunnery trainer or the BGMTS device or a PGS precision gunnery laser system and subcaliber gunnery will offer reinforcement for the gunnery skills which are needed to engage targets effectively using the BIFV´s weapon systems. Efforts are presently underway to determine the optimum combinations of these gunnery training devices, to insure maximum effectiveness in coverage.

Similarly apparent is the fact that currently available Bradley training devices do not address the tactical task performances, techniques or skills which are required of the Bradley leader. Implicit in this fact also is the acknowledgement that evaluation of the Bradley leader´s required command and leadership skills and troop leading procedures is therefore also not addressed by the available devices. Thus the BIFV leader is never challenged to combine his various knowledges and skills to indicate comprehension of the most effective combinations in a combat situation.

Specific Task Requirements for Tactical Trainer

In any attempt to provide training device support for tactical tasks for the BIFV leader, it is necessary to provide a (simulated) BIFV (with all major weapons systems available) with capacity for integrating the roles of a Bradley commander, gunner and driver, and providing a dismount team capability.

The device must offer the capacity for surrogate travel, over varied terrain, and offer the leader the opportunity for command and control over both the vehicle and dismount elements in all kinds of visibility and weather conditions. Decision making choice points in a variety of tactical scenarios must be depicted through realistic film or by simulation through computer generated graphic overlays. (See Table 17 for requirements.)

Further, for each of the 32 tasks noted at Table 16 as being in need of training device support, there are a number of subtasks or component tasks which must be taken into consideration in planning scenario and training device development. In Table 18 these subtasks, as detailed in Appendix A, Bradley Leader Task List, are matched against the task areas which have been determined to be in need of training device support. The ten major areas from Appendix A are the following: 1, Orders; 2, Assembly Area Activities; 3, Precombat Checks; 4, Tactical Movement; 5, Deploy Dismount Team; 6, React to Enemy Contact; 7, React to Emergency; 8, Offensive Operations; 9, Defensive

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Table 17

Tactical Trainer Requirements

CONDITIONS	INPUT (stimuli)	OUTPUT (responses)	FEEDBACK (results)
visibility	offensive/defensive	use intercom	visual
day	scenarios		vehicle movement
night	single targets	use radio	dismount movement
restricted	multiple targets	higher	weapon effects
fog	moving targets	subordinate	
smoke	stationary targets	adjacent	auditory
	variable range		radio
weather	variable type	movement	intercom
rain		start	weapon effects
snow	combined arms	stop	
sleet	vehicle identification		consequences
	friendly		timing error
terrain	enemy		judgement/decision err
desert			mobility kill
mountain	requirement for dismount	give orders	catastrophic kill
built up		plan	
woods	requirement for movement	select position	
plains		range cards	
	terrain	fire commands	
noise	assembly	control	
external	tactical movement		
internal			
MOPP			
team training			

Table 18

BIFV Leaders' Tasks and Subtasks from Appendix A, Bradley Leader Task List

Level			Task	Subtask Area
s	p		Assign assembly area positions/recon	2.3, 2.5
s	p		*Perform PMCS/precombat inspections	2.4, 3.2, 3.3
	p		Combat load	3.4
s	p		*Supervise driving	4.2., 4.3, 4.4
s	p		Supervise movement to contact/security	8.1
		c	*Maintain turret orientation	4.4
s			Maintain MOPP	5.2, 6.1, 6.2
s	p	c	*React to weapon malfunction	7.7
s	p	c	*React to vehicle emergency	7.1, 7.2, 7.3, 7.4, 7.5, 7.6,
s	p	c	Establish security	2.1, 4.4
	p		Practice battledrills	3.5, 4.1
	p	c	Take action on contact	8.3
		c	Report to higher headquarters	6.5, 8.3
	p	c	React to direct/indirect fire	6.5
s	p	c	React to NBC, directed energy threat	6.1, 6.2, 6.3
s	p		React to air attack	6.4
s	p		Suppress ATGM	6.4
	p	c	Return fire with appropriate weapons	6.4
		c	Use smoke	4.7
	p	c	Call for direct/indirect fire support	6.5, 8.4, 9.3
s		c	OPORD/plans/limvis	1.3, 1.4
		c	Determine mounted/dismounted attack	8.4
s	p	c	Deploy/cover dismount	5.0, 5.1
s	p	c	Attack	8.0, 8.4
s	p		Reach objective/consolidate	8.5, 8.6
	p	c	Primary/alt/suppl def positions	9.1
	p		Identify enemy avenues of approach	9.1
	p	c	Assign targets/priorities/sectors	9.4, 9.5
	p		Make range cards/sector sketches	9.2
	p	c	*Defend against long range targets	9.5
	p	c	Conduct retrograde operations/DLIC	9.6
s	p		Reorganization	10

Note. Task Areas from Appendix A are as follows:

1. Orders
2. Assembly area activity
3. Precombat checks
4. Tactical movement
5. Deploy dismount team

6. React to enemy cont
7. React to emergency
8. Offensive operation
9. Defensive operation
10. Reorganization

The letters in the Level column indicate that the task appeared on the squad leader (s), platoon leader (p), or company commander (c) list of critical tasks.

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Operations; and 10, Reorganization. The specific component areas from this list which match the BIFV leader tasks have been indicated in Table 17. At a minimum, opportunity must be provided for the BIFV leader to exercise these particular subtasks in a tactical trainer.

Potential Use of TACMASS and Other Large Scale Simulations

The perception that there is a need for training devices designed to teach tactical operations is not unique to analysis and study of the Bradley battalion. This is evidenced by the Army-wide interest in the ongoing development of the tactical maneuver simulation system (TACMASS). TACMASS will be available not only for M2/M3 Bradleys, but for M1 and M60A3 tanks, M113 Armored Personnel Carriers, and Improved Tow Vehicles (ITVs). TACMASS is planned to cover command and control in offensive operations, including movement to contact, hasty attack, bypass, deliberate attack, exploitation and pursuit, attack during periods of limited visibility and clearing obstacles. Defensive operations include the active defense, delay, counterattack, defensive operations during limited visibility, and withdrawal.

Since TACMASS is being based on an already fielded concept and device, the German Advanced Tank Combat Simulation System (APKA), the usual training device developmental time will be relatively short, and evaluation is planned for the prototype models in less than two years. The major question that now remains is whether the TACMASS system, the parameters of which are still being formulated, can be programmed to cover Bradley leader's critical tasks, and thereby reduce the need for coverage of these tasks in another as yet to be developed training device. Since the simulation is designed for platoon and higher training support, troop leading skills and leadership functions will probably be covered fairly well. However, since TACMASS is designed as a platoon and company level trainer, it is not known whether the infantry skills required in both mounted and dismounted performance of the Bradley dismount element will be adequately covered. A further question remains as to the location of any TACMASS, and the availability to potential users.

Another potentially very useful large scale simulation device for tactical training is in the initial stages of development. The Company/Team Tactical Simulation System (COLTSIM) is similar to TACMASS in many respects and will provide opportunities for command, control and communications tasks in a real time simulated combat environment. Designed to be used as one in a series of training devices progressing from simple gunnery skills to complex battalion activities in a combined arms trainer, COLTSIM shares many of the same strengths and weaknesses as TACMASS. It is expensive, relatively inaccessible to individual units, and at present, has only limited application to the BIFV, although task descriptions may change to reflect BIFV-specific techniques. Although COLTSIM is not to be fielded until 1991, its development must be monitored for Bradley relevance.

Similar in coverage, although different in scope, are the simulations represented by SIMNET and SIMCAT. SIMCAT will attempt to focus on platoon level operations; SIMNET will cover battalions. Neither will specifically address gunnery; both cover tactical employment of vehicles in a combined arms

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simulation. SIMCAT is conceptualized as an evaluation device, and to date, focuses on tank employment. SIMNET is still in early development stages; the first platoons of vehicle simulators will not be available until, at the earliest, late 1985 and early 1986.

Potential Use of GAMES

One alternative to use of the TACMASS concept for implementation of training of Bradley leadership skills would require modification of existing board games and computer based games to cover skills needed in Bradley employment. Inclusion of the Bradley would not represent a difficult problem for most kinds of games, and would not require extensive changes for others. Games tend to focus on planning for operations, and movement across terrain in accordance with specific rules; techniques of employment of vehicles within a battalion can be reflected in rule changes to accommodate weapon system employment and mobility characteristics of the BIFV battalion.

Although games are excellent as tactical trainers, they are particularly appropriate for training personnnel in the knowledge and skills related to combat support and combat service support. Conversion of logistical and support information to that of a Bradley battalion would require little time or expense. Training in service support areas is particularly important for the Bradley battalion, despite the fact that the individuals contacted during this study did not feel that these areas represented great training difficulties. For the platoon leaders questioned, the changes in logistics and support brought about by Bradley battalions were not given high ratings. They indicated that the battalion executive officer and staff officers would provide input in these areas and that furthermore, the changes were not very complex. Although the company commanders were more cognizant of the logistics and support requirements of a mechanized battalion, they did not rate these areas high either.

However, discussion of this finding with experienced combat veterans indicates that the raters contacted may have underestimated the difficulties involved in logistics for a mechanized battalion. On a practical basis it is apparent that both platoon leaders (and sergeants) and company commanders must be aware of the support demands created by a BIFV platoon or company, and any training devices which can help teach the appropriate lessons are potentially useful. On the company and battalion level, knowledge of combat service support is imperative, and a gaming situation permits this planning.

Potential Use of EIDS

The final approach in potential training devices is that represented by a tabletop man-portable EIDS type device. EIDS would operate on a smaller scale than the TACMASS simulation and offer a much smaller number of options. It would be similar in concept to the VIGS part task gunnery trainer, although there would be no need to replicate the turret controls in a tactical trainer. The opportunities for interaction at several levels (squad, platoon, company, battalion are all possible) and the easy portability of the EIDS system nake

the videodisc trainer a potentially valuable device. Although the limitations inherent in a part task trainer may make it a less likely candidate in an area where the platoon/company large scale simulation trainer is already so far into development, a portable trainer would complement the TACMASS trainer. EIDS could be used for squad and platoon level training both in unit and institutional training and would offer a standardized approach that would not vary from one training site to another. The different scenarios and teaching strategies offered by the EIDS approach are limited only by the number of videodiscs prepared for each training area.

ANALYSIS

Just as each of the various gunnery training devices can be useful in a Bradley battalion, each of the described tactical trainers may have potential. Again paralleling the gunnery trainers, the most appropriate decision on devices may lie in the combination of several, each to serve different purposes. A large scale simulation effort could be an ideal way to prepare a battalion for its operations at the National Training Center, or to prepare for an ARTEP. However, the high cost of such a simulator, in production costs, operation costs and instructor and trainee training time, may make it impractical as a sole tactical trainer.

The addition to the inventory of games designed for particular levels of Bradley command would supplement the large scale simulation in an advantageous manner. The support tasks and logistics implications for a Bradley squad, platoon, company or battalion can be reinforced in a gaming situation; so too can some aspects of tactical employment. But games also have limitations; the more sophisticated are little more than steps away from the large scale simulations in complexity and the resulting costs; the simpler games may not be sufficiently encompassing or challenging for higher levels of leadership and may not adequately represent the complexity of job performance. Leaders at platoon and squad level may not have the time available to learn complex rules to play a game.

The low cost EIDS approach may be appropriate for a platoon or squad level trainer although it may be found to be too simplistic or limiting for higher levels of leadership. Advantages include accessability, the relative speed with which it could be developed and the potential for simultaneously serving several levels of leadership. Another important potential EIDS contribution is that is offers uniformity for active Army, National Guard and Reserve Unit tactical training. The interactivity helps provide trainee motivation; the disc format allows different tactical scenarios and task areas to be presented according to the demonstrated need. A combination of the three categories of devices may be necessary to cover training in all the tactical task areas in need of training reinforcement for effective employment of the Bradley in a combat situation.

Based on the application of the procedures detailed in the Handbook for Training Developers, the development of the list of Bradley leader tasks, the analyses made by leaders at varying levels in regard to task criticality, extensive interviews with Bradley subject matter experts, and examination of the training devices currently and potentially available, the following conclusions are made:

1. Gunnery training devices already available must be used to their fullest, incorporating into their use as many as possible of the tasks which are required of the Bradley leader. Further, they must be used in the training of individuals at all levels of leadership. Although the leaders in field grade command positions do not necessarily need to be able to apply gunnery principles in a combat situation, they need to know the BIFV specific skills required of the men in their companies and battalions, as well as the capabilities and limitations of the vehicle and weapon systems.

The use of gunnery trainers will not only sharpen the skills needed for effective target engagement, but will provide further familarity with turret operations. The more experience the individual gains in practicing the operations of the vehicle, the less attention he will have to pay to them in a combat situation; overlearning of the hands-on operational gunnery skills will permit the leader to focus on the decision making, troop leading, and leadership tasks required of him in the combat situation. Thus the gunnery training devices available can help insure that the BIFV leader at any level is aware of and able to deal with the operational tasks of the Bradley. Work must continue on determination of the best combinations of gunnery devices for different situations.

2. The gunnery devices which employ the Bradley itself must be utilized in a way to maximize training potential by being used in a manner to cover more than just simple gunnery skills whenever possible. Any time the vehicle is operating, tactical situations should be simulated where practical, and every effort must be made to insure that correct procedures are followed. Opportunities for full crew interaction, to include activities for the driver and for the troops riding in the troop compartment, should be practiced, including both mounted and dismounted crew drills. Leaders must be aware of the additions to combat strength provided by the BIFV dismount element, and must practice training with MILES or other evaluation systems to insure that the BIFV is utilized to the fullest possible extent. Since some of the greatest difficulties in coping with the leadership demands of the Bradley come from the need to integrate a large number of skills into a smoothly functioning performance, attempts should be made to practice as many as possible of these skills during gunnery training.

3. The TACMASS, COLTSIM, and other large scale simulation projects must be monitored very carefully to insure that Bradley specific skills are covered for both the mounted and dismounted modes of operations. To the extent that new techniques are being developed to reflect Bradley employment in a combined arms tactical situation, these simulations must incorporate the strengths and weaknesses and capabilities of the BIFV. Leaders must practice deployment of dismount team, and all of the vehicle-squad interactions. The mobility brought to the modern battlefield by the BIFV must be maximized, and leaders must be trained in the most effective ways to use the vehicles in relation to each other, and in relation to the dismounted infantry and tanks in a combined arms scenario. TACMASS and COLTSIM can provide effective training in weapons system selection, and in control of platoon and company fires, and can train principles of movement. They can also provide guidance in training combat support and combat service support as these functions relate to the Bradley. A limitation of the large scale simulations is found in the fact that these simulations are still in early stages of development; the need for tactical training is acute enough that their expected fielding times may be too far in

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the future. Too, any such ambitious projects and trainers are costly in terms of production and in resources required to implement training. A further limitation is that, on a practical basis, such trainers will not be available to any one battalion with any regularity.

4. An EIDS type of interactive squad or platoon level trainer, similar to the VIGS in scope but covering tactical and leadership functions, should be investigated as a relatively inexpensive supplement to the other trainers. An EIDS interactive videodisc trainer would be more readily available to crewmembers, and could be used in a homestation or institutional training setting to supplement classroom and field exercise training. Certain of the more critical skills could be reinforced by videodisc presentations in addition to the tactical exercises and ARTEPS currently offered in both the institutional and unit training settings. The EIDS approach also permits training in task areas which may be awkward or dangerous to simulate or replicate in a training environment, and offers training in a way that conserves resources in time, money and personnel.

5. The battalion commander's and the company commander's tasks, both tactical and support related, are probably adequately covered by the combina- tion of the games and command post exercises available, and the projected large scale tactical simulations. The platoon leader and squad leader benefit less from these options; and the relative inaccessibility of the large scale simulators may further limit their use, even for those at the level for which they are designed. Thus the simulators, and to a lesser extent, games, are effective only to the extent that they are <u>available</u> as trainers to the target population. Neither large scale simulators or tactical games are immediately available for personnel in the BIFV battalion, and full implementation is still several years away. A potential speedy solution to deficiencies in tactical training may lie in the implementation of a videodisc based tactical trainer. Relatively inexpensive and fairly easy to produce, EIDS would offer a training device with would cover the necessary skills for each of the four levels of command. EIDS would not substitute for large scale simulations; rather it would complement them in a way that would maximize the training potential for leaders in the Bradley battalion. (Table 19 reiterates task coverage at each level.)

RECOMMENDATIONS

After analysis of the relationship between available and potentially available training devices for the Bradley Infantry Fighting Vehicle and the critical tasks required of the leaders of Bradley squads, platoons, companies and battalions, a number of conclusions can be drawn with respect to training device requirements. 1) It is apparent that the training devices which are available or will soon be available to Bradley units and training centers primarily cover gunnery skills. 2) It is also apparent from the results of the analysis of Bradley leader task requirements that skills <u>other than</u> gunnery skills are also perceived as in need of training device coverage. 3) These tactical leadership skills are not covered by existing training devices.

Table 19

Training Device Task Coverage

CRITICAL TASK LIST Squad Leader Tasks	Task Coverage At This Level								
	INITIAL	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
Supervise terrain driving					o				///
Maintain security during movement					o				///
Supervise safe driving	x				o				///
Assign assembly area positions					o				///
Perform PMCS vehicles/weapons	x	---	---		---	---	---		---
Precombat inspections	x	---	---		---				---
Reorganization									---
Use fire commands	x	///	///	///	///	///			///
Reconnaissance of assembly area					o			---	///
Fire distribution and control	x	///	///	///	///	///			///
Attack					o	///		///	///
Reach objective					o			///	///
Consolidate					o			///	///
Specify distribution/concentration fire		///	///	///	///	///		---	///
React to chemical threat									///
Assign vehicle position/dismount					o				///
Set SOP for exit dismount					o			///	///
React to air attack						///		///	///
Suppress ATGM	x		///	///	///	///		---	///
Establish security					o				///
React to weapon malfunction/25	x							---	---
React to veh emergency/ISU, elect, susp	x	---			o				---
Establish assembly area security					o				///
Use effective range weapons	x	///	///	///	///	///		///	///
Maintain MOPP		o	o	o	o	o			///
Exit and remount dismount team					o				///
React to nuclear threat									///
OPORD make plan					o			///	///

Note. x   extensive coverage in <u>initial</u> training

      ///   device provides adequate coverage for this level of command

      ---   device provides some coverage for this level of command

      o   coverage possible with modifications to existing device

Table 19

Training Device Task Coverage (continued)

CRITICAL TASK LIST Platoon Leader Tasks	Task Coverage At This Level								
	INITIAL	SUBCAL	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
Precombat inspections-weapons	x		---		---				—
Deploy dismount team					o		///		///
Direct fire/specify weapons					o		///	///	///
Maintain security during movement					o		---		///
Assign vehicle position/dismount					o		---	///	///
React to directed energy weapons									---
React to weapon malfunction/25, coax, TOW	x							---	---
Fire distribution and control					o		///	---	///
Reorganize							///	///	///
Perform PMCS	x		---		---				---
Fire support/obstacle coverage							///		///
Precombat inspections-vehicles	x		---		---				---
Combat load					---				
Perform detachment left in contact							///	///	///
Maintain communications/dismount					---		---		///
Practice battledrills					o		///		---
Provide covering force/dismount					o		///	///	---
Exit/remount personnel and equipment					o				
Reconnaissance of assembly area					---		///	---	///
Supervise terrain driving					o		---		///
React to direct/indirect fire					o		///	///	///
Return fire with appropriate weapons					o		///	///	///
Suppress ATGM	x				o		///	///	///
Assign targets and priorities					o		///	///	///
React to vehicle emergency	x				o		—		---
Take action on contact					o		///	///	///
Call for indirect fire support							///	///	///
Consolidate							///	///	///
Plan supporting fires							///	///	///
React to nuclear threat									///
React to air attack							///	///	///
Assign assembly area positions					o		---	///	///
Use fire commands	---				o		---		///
Use effective range weapons	---				o		///	///	///
Supervise movement to contact					---		///		///
Attack					o		///	///	///
Assign sectors/targets for dismount					o		---	///	///
Maintain security					o				///
Occupy defensive positions					---		---	///	///
Identify enemy avenues of approach					---		---	///	///

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Table 19

Training Device Task Coverage (continued)

CRITICAL TASK LIST	Task Coverage At This Level								
	INITIAL	SUBCAL	BGNTS	VICS	PGS	COFT	TACMASS	GAMES	EIDS
Platoon Leader Tasks									
Prepare alt/suppl positions								---	---
Make range cards/sector sketches	---							///	///
Defend vs long range targets	---				o		///	///	///
Company Commander Tasks									
Use effective range weapons	x						///	///	
React to weapon malfunction	x							---	---
Use fire control measures	x						///		
Use patterns of fire							///	///	///
Use fire commands	x						///	///	
Identify targets							///	///	
React to vehicle emergency	x						---		
Deploy dismount team							///	///	
Coordinate with FIST							///	///	
Call for indirect fire support							///	///	
Call for lift/shift fires							///	///	
Take action on contact							///		
Attack							///	///	
Determine mounted/dismounted attack							///	///	
Call for direct fire support							///	///	
Conduct retrograde operations							///	///	
Maintain retrograde security							///	///	
Perform detachment left in contact							///	///	
Conduct retrograde movement							///	///	
Plan retrograde fire support							///		
Conduct delay, withdrawal, retirement							///	///	
Conduct the defense							///	///	
Assign targets defense							///	///	///
Defend vs long range targets	---						///	///	
Defend vs close in targets	---						///	///	
Specify distribution/concentration fire							///	///	
Assign area coverage/sectors							///	///	
Maintain turret orientation	x						---		
Specify ammo type	x						///	///	
Supervise movement to alt/suppl position							///	///	
Maintain fire distribution/control							///	///	
React to directed energy weapons									
Return fire with appropriate weapons	---						///	---	
Make OPORD/restrictions on fire support							///	///	
React to direct/indirect fire							///	///	

Table 19

Training Device Task Coverage (continued)

CRITICAL TASK LIST	Task Coverage At This Level								
Company Commander Tasks	INITIAL	SUBCAL.	BGMTS	VIGS	PGS	COFT	TACMASS	GAMES	EIDS
Occupy defensive positions							///	///	
Coordinate fire support plan							///	///	
Report to higher headquarters							///	///	///
Direct fire/specify weapons							///	///	
Assign targets and priorities							///	///	
Use smoke							---	---	
Use illumination plans/lim vis devices							---	---	
Assault line-location and signal							///	///	

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Based on knowledge about the components of critical Bradley leader tasks, and about the coverage offered by existing devices, the following recommendations are made:

Gunnery Devices

1. SUBCAL. Subcaliber devices should continue to be used as part of the gunnery training programs in both the institutional and unit environments. In terms of both manpower and ammunition resources they provide relatively inexpensive initial training in gunnery and manipulation. They may also be used for sustainment training before gunnery exercises, for squad leaders and for platoon leaders who may be performing some of the same duties as squad leaders. Subcaliber devices cannot be used as tactical trainers.

2. BGMTS. BGMTS is useful as a gunnery training device for both initial and sustainment training. It permits training on the same skills as the subcaliber devices, and more. BGMTS offers varied scenarios and large numbers of opportunities for each trainee, at a relatively low cost. It is ideal for training situations where maneuver space is not available, or where vehicles are limited in supply, especially in Reserve and National Guard Units. BGMTS does not permit vehicle movement, however, and is limited by the film available. BGMTS is suitable for training at all levels; it may be particularly good as a gunnery trainer for company and battalion level where a familiarization with the equipment and procedures is more important than perfection of gunnery skills and actual target engagement. Although tactically based scenarios can be depicted in the film presentations, BGMTS does not train tactical skills.

3. VIGS. VIGS is an inexpensive part task single station gunnery trainer which is useful in both an institutional setting and in a unit's local training area. Particularly valuable in training part tasks like correct burst size and in tracking, VIGS can be used to train individual gunners before they advance to live fire. Since VIGS offers reinforcement training at a very elementary level, it can be used to provide extra training for an individual who is having difficulty in learning or perfecting gunnery skills. In its present configuration, VIGS is not useful for tactical training.

4. PGS. PGS offers potential in two areas. As a gunnery trainer, the precision laser offers the opportunity for accurate measurement of target engagements. The capabilities of the system and savings in ammunition appear to be enough to offset the initial costs of the equipment, and it can be used in both small and large training areas. PGS can be used for gunner training for squad and platoon level leaders, but could also be used for familiarization by company and battalion level leaders. The other area in which the PGS can be useful is in training force-on-force engagements, where several vehicles are equipped with the precision laser sensors. Platoon level tactics could be practiced relatively easily by equipping friendly and OPFOR vehicles with PGS; engagements at company level and above would be too complex. If PGS and MILES were to be made compatible, the activities of dismount elements could also be included, further providing the tactically related training necessary at squad/platoon level. Thus the precision gunnery systems have potential for use as both gunnery and tactical trainers.

5. COFT. The Conduct of Fire Trainer, both the unit and institutional models, will provide precise measures of target engagement capabilities and weapon system usage for commanders and gunners at squad level while effecting great savings in ammunition expenditure. A future platoon level COFT may also provide capabilities for platoon fires. The COFT does not provide initial training, and as a sustainment trainer is extremely costly. Training time to use the device is also quite high. Although the COFT provides opportunity for "attack," the training is in no way tactical training; COFT is a gunnery trainer. The COFT will come to units in the near future, and training programs will have to be developed to insure that this gunnery training potential is maximized.

Potential Tactical Trainers

6. TACMASS. The large scale simulations proposed for the near and distant future will, if designed as planned, offer the opportunity for tactical training through surrogate travel and multiple vehicle combined arms activities. These simulators are, however, very expensive, and require extensive development time, and intense user training time. Although a few are planned to be designed for platoon level training, most are aimed at company, battalion and higher operations, and are therefore unsuitable for squad level training. Platoon training may also be severely limited. A further problem involves accessability of these kinds of trainers; they are not readily available to user groups, particularly to lower levels of command. Further, the simulations which are in development now must be examined to insure that Bradley specific capabilities are incorporated into the combined arms scenarios, expecially where the dismount element is concerned. Recommendation is made that efforts continue in the area of development of large scale simulation, with acknowledgement of the fact that usefulness may be limited by availability to units, and that effective coverage will probably be limited to tactical training of company and higher levels of command.

7. GAMES. Games are available on many levels, and with variable degrees of difficulty. Most are intended to be tactical trainers rather than gunnery trainers, although many do not serve either purpose. Some of the terrain board games may be suitable for tactical training for squad and platoon level leaders, particularly in the institutional setting. Other games are potentially garrison type trainers, in which players are using off duty time to play tactically based games. As games become more complex, the level for which they are designed rises, and they therefore become both unsuitable for and unavailable to personnel at lower levels of command. For both company commanders and battalion commanders there are more complex games which are designed to reinforce skills in long range planning and command and control and offer training in tactical operations. For battalion level, there are also games which specifically address the activities of service support elements, and others which provide for integration of the activities of battalion staff and command elements. These complex games and simulations are relatively inaccessible except in the institutional environment and the necessity for clearly defined rules can limit their usefulness in providing realism. They do, however, offer a good complement for command post exercises and tactical exercises without troops at relatively low cost. Recommendation is made that

games available for company and higher levels of command be adapted to incorporate Bradley specific tasks, and that simpler games for tactical training reinforcement be made available to squad and platoon leaders for off duty play.

8. EIDS offers potential for training in a number of areas, and at different levels. The interactive approach is already evidenced in the VIGS gunnery trainer and EIDS could be employed to supplement training of some elements of gunnery skills. However, it could also be used as a classroom tactical trainer, particularly at squad and platoon levels where the complexity of scenarios is limited and there are no other tactical trainers available. The operations commanded by a company or battalion commander are probably too complex for videodisc presentation, although some part tasks could be trained. For the platoon leader, and more particularly for the squad leader, an EIDS presentation would offer small unit tactics by presenting typical scenarios. The potential for using a videodisc system in any size training area makes it suitable for sustainment training, and as a complement to other initial training techniques. The standardization possible also offers benefits for National Guard and Reserve training. Recommendation is made that an EIDS system for tactical training be investigated for squad and platoon level unit and institutional use, with the possibility of application at higher levels.

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MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
1.0 Orders	1.1 Receive the Mission	- Receive orders from superior - Analyze mission/tasks - Begin estimate of situation	
	1.2 Issue a Warning Order	- State mission - State time - Initiate movement to assembly area - Specify time/place OPORD to be given	
	1.3 Make a Tentative Plan	- Develop a concept	Scheme of maneuver, estimate, METT-T, OCOKA
		- Perform a recon of area	Terrain, objective, routes, patrol, day for night, maps
	1.4 Complete the Plan	- Develop a scheme of maneuver	Main effort, specific tasks, times, control areas, axis, LD, OCOKA, RP
		- Make a fire support plan	On route, on objective, beyond objective, smoke, illumination
		- Coordinate	With FIST chief, XO, adjacent units
	1.5 Issue OPORD/ FRAGO	- Describe the situation	Enemy forces, friendly forces-- higher, adjacent, supporting, attachments, detachments
		- State the mission	Who, what, why, when, where
		- State the concept:	
		- Scheme of maneuver	Mission, movement techniques, direction, order of march, positions, sectors, engagement area, guides, boundaries, routes, limits, position of leaders, number and type of platoons, enemy strength, key terrain, formations, command and control

MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
1.0 Orders	1.5	Issue OPORD/ FRAGO	- State the concept:	
			- Specify fire support plan	Preparation, protection, priority, key personnel, timing, obstacles, type and kind of support (mortar, artillery, naval, attack helicopter, other air) illumination plans and signals, restrictions, timing, antiarmor plan, smoke, maneuver elements to receive priority
			- State missions for subordinates	Coordination, clarification, special instructions/control
			- Describe combat service support:	
			- Coordinate through XO	
			- Coordinate company trains	Movement, arrangement, organization, positioning, routes
			- Coordinate with non-organic support	Scout platoon, anti-armor company, remote sensor teams, air defense artillery, combat engineers, close air support, field artillery, electronic warfare intelligence, military intelligence, signals, battalion mortar
			- Logistics	Ammo, POL, spare parts, equipment, vision devices, clothing, arms, supplies
			- Food services	Rations, food, water
			- Medical evacuation	Aid men
			- Maintenance	Disabled vehicle recovery, OM
			- Commo	Tactical NET, Admin NET
			- Establish command and signal	
			- Location chain of command	Company and Battalion CP/OP Plt Ldr, Plt Sgt, company team commander

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
1.0 Orders	1.5 Issue OPORD/ FRAGO	- Establish command and signal	
		- Signal	COEI index, call signs, frequencies, challenge password, pyrotechnics, signal restrictions, codewords, illumination signs
		- Specify control areas/avenues (day and limvis)	Assembly area, attack position, boundaries, axis of advance, line of departure, point of departure, possible line of deployment, infantry dismount point, release point, assault position, objective, limit of advance

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
2.0 Assembly Area Activities	2.1 Establish Assembly Area Security	- Select locations	Local, OP, COPL, OPLP
		- Maintain defensive security	Air guard, observation posts, patrols, challenge passwords, mines, barbed wire, trip flares obstacles, NBC watch, STANO, visual recognition cues
		- Maintain physical security	Perimeter, sectors, positions, avenues of approach, camouflage, 360 degrees, PEWS
		- Enforce light/noise discipline	Movement, speed, vision blocks, driver viewer, goggles, lights blackout, ISU turn on SOP, personnel
		- Maintain commo restrictions	Visual, minimum length, authentication, electronic, COLI change
	2.2 Establish Communication	- Establish a wire net	
		- Prepare visual commo signals	Hand/arm, flashlights, flags, pyrotechnics, mirrors, luminescents
		- Prepare auditory signals	Whistles, horns, gongs, explosives
		- Send messengers	
		- Use radios	Vehicular, dismounted, listening silence
		- Use intercom	
		- Establish reporting SOP	Fuel/ammo, SPOTREP (SALUTE), SITREP, SHELREP, NBC, EW (MIJI) chain of command, patrol debriefing, POW report, personnel & logistic reports, minefields
	2.3 Assign Assembly Area Positions	- Assign vehicle positions	Primary, alternate, ground guides
		- Assign weapon orientation	Ready posture, turret orientation

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MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
2.0 Assembly Area Activities	2.4	Supervise PMCS	- Check PMCS on vehicles:	
			- Suspension	Track, road wheels, tension, pads, arms, pins
			- Driver area	Steering, acceleration, gears, brakes (vehicle/hand), night viewer, instrument panel, ramp
			- Engine	Fluids (all), transmission system, cooling system, batteries, air cleaner, final drive
			- Turret	Control box, weapon box, turret drive box, stabilization
			- Optics	ISU (day/thermal), night devices, backup sight
			- Check PMCS on weapons:	
			- Before operation PMCS	25mm, coax, TOW, FPW
			- Function check	25mm, coax, TOW, FPW
	2.5	Recon Assembly Area	- Perform recon	Routes of withdrawal, maps, terrain features day for night, weather/visibility conditions

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
3.0 Precombat Checks	3.1 Perform Precombat Inspection of Personnel	- Assess status	Leaders, key weapon gunners
		- Determine individual needs:	
		- Personal	Water, rations, ID
		- Clothing	LCE, MOPP, mask, combat uniforms
		- Weapon	Clean, clear, ammo, night device
		- Fed	
		- Rested	Sleep schedule
		- Briefed	Mission knowledge
	3.2 Perform Precombat Inspection of Vehicles	- Check completion of PMCS - Check fuel tanks filled - Check dificiencies reported - Night vision devices ready	
	3.3 Perform Precombat Inspection of Weapons	- Inspect 25mm gun	Clean, lube, inspect, install, PMCS, load HE, AP, stow HE, AP, cans, floor, dry-fire manual mode, power mode, boresight, boresight night sight, boresight backup sight, zero
		- Inspect coaxial machinegun	Clean, lube, inspect, install, PMCS, load, dry-fire power mode, boresight, zero, stow ammo, dry-fire manual mode
		- Inspect TOW missile system	Clean, inspect, PMCS, TOW test, load launcher, stow missiles, boresight
		- Inspect smoke grenade launcher	Clean, inspect, PMCS, load launcher, stow grenades
		- Inspect firing port weapons	Clean, lube, inspect, install, PMCS, load, stow ammo
		- Inspect individual weapons	Clean, lube, inspect, PMCS, ammo, night vision devices

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MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
3.0 Precombat Checks	3.4	Inspect Combat Load	- Check personal items	Rations (I), Personal (II, VII)
			- Check vehicle/equipment	POL, SOP refuel (III), tools (II), spare parts (IX), medical (VIII), maps, night vision goggles, devices
			- Check ammo (V):	
			- 25mm	Basic load, ready boxes, stowed AP/HE
			- Coax	Basic load, ready/stowed 7.62
			- TOW	Missiles, loaded/stowed missiles
			- FPW	Basic load, ready/stowed 5.56
			- Smoke grenades	Ammo ready/stowed
			- Individual weapons	7.62, 5.56, Dragon
	3.5	Supervise Precombat Operations	- Conduct rehearsals	Fire/maneuver, actions on contact, reactions, movement, battle drills, recon
			- Make spot check inspections	Rations, water, weapons, ammo, individual uniforms, equipment, camouflage, mission essential equipment, knowledge of mission, responsibilities, MOPP
			- Coordinate with other units	Higher, adjacent, supporting

MISSION PHASE		TASKS		SUBTASKS	COMPONENTS
4.0	Tactical Movement	4.1	Practice Battle Drills	- Vehicles change movement formations	V, echelon left, echelon right, wedge, line, column
				- Arm and hand signals	
				- Change formations on enemy contact	
				- Action left, right, rear	Direction signal, flanking turn hull down, main gun and TOW oriented to threat
				- Maintain security at a temporary halt	Vehicles dispersed according to terrain, herringbone, covered/ concealed, areas of responsi- bility for observation and fire dismount leader, weapons, night vision devices, noise/light discipline
		4.2	Supervise Terrain Driving	- Plan navigation	Day/limited visibility, stabili zation system, terrain asso- ciation, recon day for night
				- Select routes	Cover and concealment
				- Evaluate traffic- ability	Weather, guides
				- Cross bridges	AVLB, raft
				- Cross water	Ford, swim, entrance, exit points, swim barrier
		4.3	Supervise Safe Driving Procedures	- Specify order of movement	Leader position
				- Monitor speed of movement	Day/limited visibility
				- State vehicular intervals	Day/limited visibility
				- Evaluate need for visual contact between vehicles	Day marking system, limited visibility
				- Select vehicle form- ations and positions	

MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
4.0 Tactical Movement	4.3	Supervise Safe Driving Procedures	- Determine hatch positions	Driver, commander, gunner
			- State start/stop signals	Horn
			- Use vehicle lights	
			- Utilize night vision devices	Driving, navigation
			- Use ground guides	
	4.4	Maintain Security During Movement	- Maintain 360 degrees observation	
			- Specify weapon ready posture	
			- Maintain turret orientation	
			- Assign target priorities	
			- Assign vehicle positions	
			- Secure advance, flanks, rear	
			- Maintain air guard	
			- Use blackout procedures	
			- Use night vision devices	Night vision goggles, driver's night viewer, ISU thermal mode
	4.5	React to Vehicle Breakdown	- Remove from route	
			- Report	
			- Repair	
			- Rejoin	
	4.6	Breach Obstacles	- Specify Mounted or Dismounted	Bypass, force through, breach
			- Breach existing natural obstacles	Trees, treeline, blowdown, marshes, escarpments, ravines, gullies, ditches, swamps, streams, rivers, canals, slopes, rocks, loose soil, snow
			- Breach reinforcing/man-made obstacles	Minefields, barbed wire, entanglements, foxholes, antitank positions, logs, trip flares, Claymores, bunkers, buildings, built-up areas, posts, trenches, ditches, craters, abatis, tank ditches, rubble, field expedients, fugas

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
4.0 Tactical Movement	4.7 Use Smoke	- State purpose of smoke	Blind, obscure vehicle or personnel, conceal bypass, screen assault, cover movement, cover obstacles, counterattack
		- Timing and location	Planning ISU turn on
		- Use different kinds of smoke	Smoke grenade launchers, vehicle engine generator, hand-held, supporting
		- Assess effects	Weather, terrain, darkness, temperature, wind, humidity, cloud cover
		- Restrictions	

MISSION PHASE		TASKS		SUBTASKS	COMPONENTS
5.0	Deploy Dismount Team	5.1	Use Vehicle	- Use proper vehicle position	Sector of fire, cover, concealment, facing threat
				- Provide covering force	Volume, base, smoke
				- Determine moving/ stationary vehicle	
		5.2	Utilize Dismount Personnel	- Issue dismount alert	Composition of team/weapons, dismount weapon selection, dismount helmets, LBE, MOPP, dismount team leader, exit method and speed of dismount, remount, order of dismount/ remount, commo signals for dismount team
				- Prepare firing port weapons	Clear, removed from ramp
				- Remount casualties/ equipment	
		5.3	Dismounted Offensive and Defensive Operations	- Assign ground positions	Left, right, cover/concealment, intervals
				- Lead fire/maneuver	Direct or indirect fire, reaction, stealth/surprise, leader position, sectors, targets, priorities, fire teams, traveling/bounding techniques, cover and concealment
				- Movement	Method of movement, crawl, rush
				- Maintain commo	With vehicle, with team
				- Maintain security	Overhead cover, concealment
				- React to indirect fire	

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MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
6.0 React to Enemy Contact	6.1	React to Nuclear Attack	- Coordinate with NBC NCO	
			- Use procedures for warned or unwarned attack	
			- Safeguard vehicle/ engine	Vehicle stopped, hatches closed, engine and fuel control off, brakes locked
			- Safeguard vision/ commo devices	Vision blocks covered
			- Protect water and food	
			- Protect personnel	Skin covered, eyes shut, bodies braced, MOPP
			- Use decontamination procedures	
	6.2	React to Chemical Attack	- Protect personnel	Masked, hooded, CVC helmets for continued intercom, maintain MOPP
			- Use procedures for reduction of effects	Hatches closed, alternate positions
			- Use decontamination procedures	
			- Treat and evacuate casualties	
	6.3	React to Directed Energy Weapon Attack	- Protect personnel	
			- Protect equipment	Vision devices safeguarded, electrical equipment safe-guarded, position vehicle
			- Avoid detection	Cover/concealment, smoke, routes to eliminate line-of-sight, reduce pinpointing of locations by shooting/moving countermeasures
			- Defend	Source detection and suppression

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
6.0 React to Enemy Contact	6.4 React to Air Attack	- Maintain early warning system	air guard
		- Use passive defense	dispersion smoke cover and concealment
		- Use offensive technique	high volume, signal, use lead firing areas, IFF, ammo choice

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
6.0 React to Enemy Contact	6.5 React to Direct and Indirect Fire	- Identify source of fire	
		- Seek cover, move to alternate positions	Movement out of impact area, beaten zone
		- Report to higher headquarters	
		- Assume defensive posture	Mask, close open hatches
		- React to ATGM	Gunner suppressed, missiles avoided by driving technique
		- Return fire with appropriate weapons	Effective range of weapons; ammo status monitored for each weapon
		- Identify targets for direct fire weapons	Targets to vehicles assignment, Vision devices for acquiring targets
		- Use fire control measures	Concentrated or distributed fire, patterns of fire (depth, crossfire, frontal)
		- Use fire commands	Target type identified, target number identified, target motion identified, target priority identified, ammo type selected
		- Call for indirect fire	Coordination with FIST, lift or shift fire requested
		- Call for illumination	Trip flares, search lights, mortar, artillery

MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
7.0 React to Emergency	7.1	React to Fire on Vehicle	- Determine source of fire	
			- Determine location of fire	Turret, engine, troop compart-ment
	7.2	React to Commo Failure	- SOP - set procedures	Dismount radio failure, vehicle radio failure, intercom failure
	7.3	React to Electrical Failure	- Generator failure - Cooling system failure - Transmission failure - Final drive failure - Turret power failure	
	7.4	React to ISU Failure	- ISU	Day/limited visibility
			- Utilize backup sights	Backup sight, ring sight, vane sight, night vision devices
	7.5	React to Suspension System Failure	- Troubleshoot system and track	Torsion bars, road wheels, drive sprockets, final drive, change track
	7.6	React to Major Vehicular Problem	- Rescue mired vehicle	Towing procedures: with M2, with M28, overturned, vehicle rescue
			- Get assistance for vehicle out of POL	
			- Start another vehicle	Tow start, slave start
			- Abandon a vehicle	Permanently, temporarily
	7.7	React to Weapon Failure	- React to weapon mal-function--25mm gun	Troubleshoot, apply misfire procedure hot gun, apply misfire procedure cold gun, use reload-ing procedures
			- React to weapon malfunction--Coax machinegun	Troubleshoot, apply misfire procedure hot gun, apply misfire procedure cold gun, use reload-ing procedures

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
7.0 React to Emergency	7.7 React to Weapon Failure	- React to weapon malfunction--TOW	Troubleshoot, respond to TOW test failure, abort TOW missil apply misfire procedure TOW, u reloading procedures, remove misfired TOW missile
		- React to weapon malfunction--smoke launcher	Troubleshoot, apply misfire pr cedure, use reloading procedur remove misfired smoke grenade
		- React to weapon malfunction--firing port weapon	Troubleshoot, apply immediate action and misfire procedures, use reloading procedures, respond to vent fan failure

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
8.0 Offensive Operations	8.1 Conduct a Movement to Contact	- Recon rate	Start point
		- Specify timing	Rate, arrival at LD, crossing time, RP
		- Establish formations	Line, wedge, column open/closed, vee, echelon left/right, tightness of formations
		- Specify technique of movement	Traveling, traveling overwatch, bounding overwatch
		- Arrange combined arms mix	BIFV lead mounted, tanks follow; BIFV lead dismounted, tanks follow; tanks lead, BIFV follow dismounted; tank lead, BIFV follow mounted
		- Specify axis of advance	Routes, boundaries, checkpoints
	8.2 Cross Line of Departure	- Specify release point	Time of crossing
		- Coordinate between units	Areas of responsibility
		- Maintain weapon ready posture	
		- Continue on axis of attack	
		- Use STANO devices	
	8.3 Take Action on Contact (Meeting Engagement)	- Return fire/deploy	Fire and maneuver, cover and concealment, base of fire
		- Report to higher headquarters	Situation, recommendations
		- Develop the situation	Enemy concentration/strength assessed
		- Choose course of action	Bypass, hasty attack, hasty defense, fix and suppress, halt in covered position
	8.4 Attack	- Determine mounted or dismounted	Frontages, leadership, element size
		- Use direct fire	Weapons specified, targets assigned, sectors assigned, effective range, tracer burnout

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MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
8.0 Offensive Operations	8.4 Attack	- Use indirect fire support	Priorities assigned, indirect fire called, lifted or shifted indirect fire
		- Use illumination	Flares, grenade launcher, aircraft flare, searchlight
		- Use smoke	Amount, placement, type, restrictions
		- Use limvis control measures and devices	
		- Assault line	Location, signal
	8.5 Assault the Objective	- Specify limit of advance	
		- Initiate exploitation	Secure terrain
		- Pursue	Destroy personnel
		- Apply a direct pressure force	
		- Encircle	
	8.6 Consolidate	- Reestablish security	Early warning observation posts, key leadership positions refilled, key weapon positions remanned, ammo and supplies redistributed
		- Repel a counterattack	Pockets of resistance cleaned up sectors of fire designated, dismount positions, OCOKA (observation, cover/concealment, obstacle, key avenues of approach) supporting fires planned, range cards, camouflage, obstacles emplaced, fields of fire cleared

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
9.0 Defensive Operations	9.1 Occupy Defensive Positions	- Establish security in the defense	Local, OP, COPL, OPLP, area recon
		- Occupy primary positions	Maintenance of surveillance, vehicle and automatic weapon positions selection, positions marked and improved, sectors of fire, fields of fire cleared, identified enemy avenues of approach and boundaries, identified key terrain, dug in, prepared cover, concealment, camouflage--ground, prepared cover concealment, camouflage--air, emplace obstacles, mines
		- Assign and prepare alternate and supplementary positions	Area recon, positions selected, routes to positions cleared, movement rehearsed, positions improved, hide positions
	9.2 Make Range Cards (Sector, Sketches, Platoon Overlays)	- Mark vehicle positions	Vehicle weapons and range specified, tracting times
		- Mark dismount positions	Dismount weapons and range specified
		- Show terrain features	Indication of target reference points, dead space, obstacles
		- Show assembly area and boundaries	
		- Indicate sectors of fire	Primary, secondary
		- Indicate range	FPL, PDF, effective range of weapons
	9.3 Coordinate Fire Support Plan	- Coordinate with battalion fire support	
		- Locate targets	Coordination points, FEBA, EA, TRP
		- Call for indirect fires	Timing, type, close air, mortar, artillery, call for adjustment of indirect fire

MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
9.0	Defensive Operations	9.3 Coordinate Fire Support Plan	- Arrange for coverage of obstacles, dead space, contaminated areas	
			- Plan illumination	
			- Plan visible and invisible surveillance	Use ground vehicle, laser locator designator
			- Coordinate NBC plans	NBC chief coordination, status monitored, plan decontamination procedures
		9.4 Coordinate Between Adjacent Positions	- Describe sectors of fire	Vehicles and dismount, frontages
			- Describe location of dead space between units	
			- Describe location of OPs	
			- Describe location of dismount teams	
			- Plan coverage of obstacles	
			- Maintain intervisibility	
			- Identify patrols	Size, type, timing, routes
		9.5 Maintain Fire Distribution and Control	- Assign sectors	Targets assigned, TRPs indicated, priorities set
			- Defend against long range targets	LAV, BRDM, BMP, tanks, ammo type specified for combat load
			- Defend against close in targets	Infantry, dead space, ammo type specified for combat load
			- Specify fire distribution/concentration	

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MISSION PHASE		TASKS	SUBTASKS	COMPONENTS
9.0	Defensive Operations	9.5 Maintain Fire Distribution and Control	- Specify type of fire	Crossfire, frontal, depth
			- Assign area coverage, responsibility	
			- Maintain turret orientation	Ready posture
			- Supervise movement to supplementary and alternate positions	
		9.6 Conduct Retrograde Operations	- Use METT-T	
			- Use timing	
			- Maintain security	Detachment left in contact (DLIC)
			- Use deception	
			- Assign positions	Initial, subsequent
			- Conduct movement	Passages of lines, routes
			- Plan fire support	
			- Conduct a delay (space for time)	
			- Conduct a withdrawal (avoid contact, reposition)	Not under pressure, under pressure
			- Conduct a retirement (move to avoid contact)	

MISSION PHASE	TASKS	SUBTASKS	COMPONENTS
10.0 Reorganization	10.1 Prepare Personnel	- Make proper disposition of casualties	Movement to cover, treated, evacuated
		- Request replacements - Fill key leadership positions - Fill crew-served weapon positions	
		- Send POWs to collection point	Evacuation arranged, captured documents
		- Rest and feed troops	
	10.2 Prepare Weapons	- Troubleshoot - Perform PMCS - Reload - Redistribute ammo - Request ammo resupply	
	10.3 Prepare Vehicles	- Troubleshoot - Perform PMCS - Redistribute supplies - Request supplies, POL - Make repairs - Refuel	
	10.4 Submit Status Report	- Indicate situation	Location, position, estimate
		- Report on personnel	Casualties, wounded, missing, replacements, prisoners
		- Report on vehicles and equipment	POL, ammo, supplies on hand and needed, lost vehicles
	10.5 Reconstitute the Defense or Prepare For the Next Attack	- Reestablish security - Reestablish commo - Reposition vehicles, personnel, weapons - Cover sectors of fire - Replace camouflage/obstacles - Coordinate with adjacent units	

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
8	4	2	2	2	0	2	4	1	Establish assembly area security: locations, defensive, physical, light, noise, commo
8	2	2	1	1	1	2	4	1	Establish communication: wire net, visual, auditory, radios, etc.
1	1	1	0	1	1	1	0	0	Establish SOP for reporting (SITREP, SPOTREP)
27	12	2	3	2	3	2	3	3	Assign assembly area positions: weapons and vehicles
27	6	3	3	1	3	2	3	3	Supervise PMCS vehicles and weapons
18	4	2	3	2	2	2	3	1	Recon assembly area
9	2	3	3	2	1	1	3	1	Perform precombat inspection of personnel: leaders, key weapons, individual needs
27	4	3	3	2	3	2	3	1	Perform precombat inspection of vehicles: completion of PMCS, fuel tanks, deficiencies reported
27	4	3	3	2	3	2	3	1	Perform precombat inspection of weapons: inspect 25mm gun, coax, TOW, FPW, individual weapons
18	2	2	3	1	3	2	2	1	Inspect combat loading of vehicles
	NOT APPLICABLE SQUAD LEVEL								Practice battledrills: movement, change formations, maintain security at a halt
36	18	2	3	2	3	3	4	3	Supervise terrain driving: navigation, routes, evaluate trafficability, cross bridges, cross water, use cover and concealment
36	12	2	3	2	3	2	4	3	Supervise safe driving procedure: order, speed, intervals, visual contact, formations, positions, start/stop signals, utilize night vision devices
36	18	2	3	2	3	3	4	3	Maintain security during movement: 360 degree observation, weapon ready posture, turret orientation, target priorities, vehicle positions, air guard, blackout
3	0	3	2	–	–	–	–	–	React to vehicle breakdown during tactical movement

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
18	2	3	3	1	3	2	Ø2	1	Breach obstacles: mounted or dismounted, manmade, natural
18	2	2	3	1	3	2	Ø2	1	Use smoke: kinds of smoke, effects of darkness, weather, terrain
-	-	-	-	-	-	-	-	-	Deploy a dismount team:
18	2	2	3	1	3	2	Ø2	1	Use proper vehicle position
12	4	2	2	2	3	2	Ø2	1	Provide covering force
12	4	1	2	2	3	2	Ø2	1	Exit and remount method, speed and order
-	-	-	-	-	-	-	-	-	Provide commo signals for dismount team
8	1	1	2	1	2	1	Ø2	1	Issue dismount alert - weapons, helmets, personnel
4	2	1	1	2	2	1	Ø2	1	Prepare firing port weapons
6	4	2	3	2	2	2	Ø2	1	Monitor use of MOPP
-	-	-	-	-	-	-	-	-	Specify dismount team leader
6	4	2	3	2	1	2	Ø2	1	Remount casualties and equipment
-	-	-	-	-	-	-	-	-	Assign ground positions to dismount team
6	2	2	3	1	0	2	Ø2	1	Lead fire and maneuver, traveling and bounding
-	-	-	-	-	-	-	-	-	Assign sectors, targets, priorities
4	2	2	2	1	1	2	Ø2	1	Maintain commo
-	-	-	-	-	-	-	-	-	Maintain security, overhead cover, concealment
6	2	2	3	2	0	1	Ø2	1	React to direct and indirect fire
18	2	2	3	0	3	2	Ø2	1	React to directed energy weapon threat: Protect personnel, vision devices, electrical equipment, avoid detection (cover, concealment, smoke) shoot and move
6	4	3	3	2	1	2	Ø2	1	React to nuclear threat: Procedures warned, unwarned; safeguard vehicle, engine, vision, commo devices; protect water, food, and personnel; use decontamination procedures
12	6	2	3	2	2	3	Ø2	1	React to chemical threat: Protect personnel, maintain MOPP; decontamination procedures, treat and evacuate casualties
12	4	2	3	2	2	2	Ø2	1	React to air attack: Early warning system, air guard, cover and concealment, use smoke; high volume of fire, use lead

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
-	-	-	-	-	-	-	-	-	React to direct fire and indirect fire:
12	2	2	3	1	2	2	Ø2	1	Return fire with appropriate weapons
4	4	2	2	2	0	2	Ø2	1	Call for, lift or shift indirect fires
4	2	2	3	2	0	1	Ø2	1	Seek cover, move to alternate positions
4	1	2	1	1	1	1	Ø2	1	Report to higher headquarters
12	4	2	3	2	2	2	Ø2	1	Suppress ATGM gunner and avoid missiles by driving techniques
18	4	2	3	2	3	2	Ø2	1	Use fire control measures, concentrated or distributed
-	-	-	-	-	-	-	-	-	Use patterns of fire (depth, crossfire, frontal)
18	8	2	3	2	3	2	Ø2	2	Use fire commands
5	8	1	1	2	3	2	Ø2	2	Utilize effective range of weapons
12	1	2	3	1	1	1	4	1	Monitor ammo status for each weapon
-	-	-	-	-	-	-	-	-	Identify target type, number, motion, priority, ammo type
-	-	-	-	-	-	-	-	-	Assign targets to vehicles
6	2	3	3	2	2	1	0	1	React to emergency – fire on vehicle
2	2	2	2	1	1	2	0	1	React to emergency – commo failure
9	3	3	3	1	3	3	0	1	React to electrical failure
6	6	2	2	2	3	3	0	1	React to ISU failure – day
9	6	3	3	2	3	3	0	1	React to ISU failure – limited visibility conditions
6	4	3	3	2	2	2	0	1	React to suspension system failure
-	-	-	-	-	-	-	-	-	React to major vehicular problem (mired, overturned, out of POL)
9	8	3	3	2	3	3	0	2	React to weapon malfunction, 25mm gun: troubleshoot, misfire procedure hot, cold gun, reload
3	2	1	1	1	3	2	0	1	React to weapon malfunction, coax machinegun: troubleshoot, misfire procedure hot, cold gun, reload
3	2	1	1	1	3	2	0	1	React to weapon malfunction, TOW: troubleshoot, TOW test failure, abort, misfire procedure
2	1	1	1	1	2	1	0	1	React to weapon malfunction, smoke grenade launcher: troubleshoot, misfire procedure

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
1	1	1	1	1	1	1	0	1	React to weapon malfunction, firing port weapon: troubleshoot, immediate action, vent fan failure
-	-	-	-	-	-	-	-	-	Issue orders:
12	1	2	3	1	0	1	4	1	Receive orders from superior - analyze mission, begin estimate
4	1	1	1	1	0	1	4	0	Issue a warning order - mission, time, movement to assembly area: specify time and place of OPORD
-	-	-	-	-	-	-	-	-	Make a tentative plan - concept
6	2	2	2	1	0	2	3	1	Perform recon of area
6	4	2	2	2	0	2	3	1	Complete plan - develop scheme of maneuver and fire support plan
6	2	2	3	1	0	2	Ø2	1	Issue OPORD/FRAGO:
-	-	-	-	-	-	-	-	-	Describe situation
-	-	-	-	-	-	-	-	-	State mission
-	-	-	-	-	-	-	-	-	State scheme of maneuver
-	-	-	-	-	-	-	-	-	Specify fire support
-	-	-	-	-	-	-	-	-	State missions for subordinates
-	-	-	-	-	-	-	-	-	Describe service support
-	-	-	-	-	-	-	-	-	Establish command and signal
4	2	2	2	1	0	2	Ø2	1	Supervise precombat operations - rehearsals, inspect for mission essential equipment, subordinate knowledge of mission
2	4	2	2	2	1	2	1	1	Conduct a movement to contact: timing (start time, arrival at LD), formations, technique of movement, combined arms mix, axis of advance
-	-	-	-	-	-	-	-	-	Cross line of departure - coordinate between units, ready posture
18	2	2	3	1	3	2	Ø2	1	Take action on contact: develop the situation, choose course of action, report
18	4	2	3	2	3	2	Ø2	1	Attack: Determine mounted or dismounted
-	-	-	-	-	-	-	-	-	Use direct fire, specify weapons
-	-	-	-	-	-	-	-	-	Assign targets, sectors, priorities
-	-	-	-	-	-	-	-	-	Call for indirect fire support
-	-	-	-	-	-	-	-	-	Request, lift or shift indirect fire

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
18	4	2	3	2	3	2	Ø2	1	Reach the objective: specify limit of advance, initiate exploitation, pursuit; apply direct pressure force, encircle
18	4	2	3	2	3	2	Ø2	1	Consolidate: Re-establish security
-	-	-	-	-	-	-	-	-	Fill key leadership positions
-	-	-	-	-	-	-	-	-	Man key weapon positions
-	-	-	-	-	-	-	-	-	Redistribute ammo and supplies
-	-	-	-	-	-	-	-	-	Clean up pockets of resistance
-	-	-	-	-	-	-	-	-	Designate sectors, positions
-	-	-	-	-	-	-	-	-	Clear fields of fire, OCOKA
-	-	-	-	-	-	-	-	-	Plan supporting fires, emplace obstacles
18	2	2	3	1	3	2	Ø2	1	Occupy defensive positions:
12	4	2	3	2	1	2	4	1	Establish security
-	-	-	-	-	-	-	-	-	Recon the area
-	-	-	-	-	-	-	-	-	Select vehicle and automatic weapon positions
-	-	-	-	-	-	-	-	-	Mark and improve positions, dig in
-	-	-	-	-	-	-	-	-	Assign sectors of fire
-	-	-	-	-	-	-	-	-	Clear fields of fire
-	-	-	-	-	-	-	-	-	Identify enemy avenues of approach
-	-	-	-	-	-	-	-	-	Identify key terrain
-	-	-	-	-	-	-	-	-	Prepare cover, concealment, camouflage-ground and air
-	-	-	-	-	-	-	-	-	Prepare alternate and supplementary positions:
-	-	-	-	-	-	-	-	-	Recon the area
-	-	-	-	-	-	-	-	-	Select and improve positions
-	-	-	-	-	-	-	-	-	Clear routes, rehearse movement
-	-	-	-	-	-	-	-	-	Make range cards, sector sketches, platoon overlays: Vehicle positions, weapons and range
-	-	-	-	-	-	-	-	-	Dismount positions, weapons and range
-	-	-	-	-	-	-	-	-	Sectors of fire (primary, secondary)
-	-	-	-	-	-	-	-	-	Range to FPL, FDF
-	-	-	-	-	-	-	-	-	Terrain features, TRPs, EA
-	-	-	-	-	-	-	-	-	Dead space
-	-	-	-	-	-	-	-	-	Obstacles
-	-	-	-	-	-	-	-	-	Coordinate fire support plan: Locate targets (coordination points, FEBA, EA, TRP)
-	-	-	-	-	-	-	-	-	Call for indirect fire (timing, type)
-	-	-	-	-	-	-	-	-	Call for adjustment of indirect fire
-	-	-	-	-	-	-	-	-	Arrange for coverage of obstacles

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
8	2	2	2	2	0	1	4	1	Coordinate between adjacent positions:
−	−	−	−	−	−	−	−	−	Sectors of fire
−	−	−	−	−	−	−	−	−	Location of dead space between units
−	−	−	−	−	−	−	−	−	Location of OPs
−	−	−	−	−	−	−	−	−	Placement of dismount teams
−	−	−	−	−	−	−	−	−	Plan coverage of obstacles
−	−	−	−	−	−	−	−	−	Maintain intervisibility
−	−	−	−	−	−	−	−	−	Identify patrols (size, type, timing, routes)
18	4	2	3	2	3	2	Ø2	1	Conduct the defense:
−	−	−	−	−	−	−	−	−	Maintain fire distribution and control
−	−	−	−	−	−	−	−	−	Defend against long range targets
−	−	−	−	−	−	−	−	−	Defend against close in targets
−	−	−	−	−	−	−	−	−	Assign targets
−	−	−	−	−	−	−	−	−	Specify distributed vs. concentrated fire
−	−	−	−	−	−	−	−	−	Specify type of fire (crossfire, frontal, depth)
−	−	−	−	−	−	−	−	−	Assign area coverage, responsibility
−	−	−	−	−	−	−	−	−	Maintain turret orientation, ready posture
−	−	−	−	−	−	−	−	−	Specify ammo type for combat load
−	−	−	−	−	−	−	−	−	Supervise movement to supplementary and alternate positions
12	2	2	3	1	2	2	Ø2	1	Conduct retrograde operations:
−	−	−	−	−	−	−	−	−	Conduct a delay
−	−	−	−	−	−	−	−	−	Conduct a withdrawal, not under pressure
−	−	−	−	−	−	−	−	−	Conduct a withdrawal, under pressure
−	−	−	−	−	−	−	−	−	Conduct a retirement
−	−	−	−	−	−	−	−	−	Use timing in retrograde operations
−	−	−	−	−	−	−	−	−	Maintain security
−	−	−	−	−	−	−	−	−	Use deception
−	−	−	−	−	−	−	−	−	Use a DLIC
−	−	−	−	−	−	−	−	−	Plan fire support
−	−	−	−	−	−	−	−	−	Assign initial and subsequent positions
−	−	−	−	−	−	−	−	−	Conduct movement and choose routes
6	1	2	2	1	0	1	3	1	Reorganize personnel:
−	−	−	−	−	−	−	−	−	Make proper disposition of casualties (move, treat, evacuate)
..	−	−	−	−	−	−	−	−	Fill key leadership positions
−	−	−	−	−	−	−	−	−	Fill crew-served weapon positions
−	−	−	−	−	−	−	−	−	Send POWs to collection point
−	−	−	−	−	−	−	−	−	Rest and feed troops
−	−	−	−	−	−	−	−	−	Request replacements
24	4	2	3	2	2	2	4	1	Prepare weapons:
−	−	−	−	−	−	−	−	−	Troubleshoot, perform PMCS
−	−	−	−	−	−	−	−	−	Reload, redistribute ammo
−	−	−	−	−	−	−	−	−	Request ammo resupply

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	SQUAD LEADER TASKS
36	2	3	3	1	3	2	4	1	Prepare vehicles and equipment:
-	-	-	-	-	-	-	-	-	Troubleshoot, perform PMCS
-	-	-	-	-	-	-	-	-	Redistribute supplies
-	-	-	-	-	-	-	-	-	Request supplies, POL
-	-	-	-	-	-	-	-	-	Make repairs
-	-	-	-	..	-	-	-	-	Refuel
8	1	2	2	1	0	1	4	1	Submit status report: Indicate situation (location, position, estimate)
-	-	-	-	-	-	-	-	-	Report on personnel (casualties, wounded, missing)
-	-	-	-	-	-	-	-	-	Report on vehicles and equipment (POL, ammo, supplies on hand and needed)
8	2	2	2	1	0	2	4	1	Reconstitute the defense or prepare for the next attack: Re-establish security
-	-	-	-	-	-	-	-	-	Re-establish commo
-	-	-	-	-	-	-	-	-	Reposition vehicles, personnel, weapons
-	-	-	-	-	-	-	-	-	Cover sectors of fire
-	-	-	-	-	-	-	-	-	Replace camouflage and obstacles
-	-	-	-	-	-	-	-	-	Coordinate with adjacent units

APPENDIX C

TRAINING DEVICES

A training device is a category of training media which enables hands-on practice in order to develop and maintain those skills required to perform the tasks when using real equipment in a real operational training environment. Training devices are training aids that vary from training films to complex simulators to the actual equipment.

Subcaliber Gunnery Training Devices

Brewster Device/Fiaoni Adapter/Reavis Device/Payne Harness/M55 Laser/Rimfire Adapt

The M180 Brewster Device with Fiaoni Adapter was designed to be mounted on the barrel of a tank gun to permit subcaliber firing. The device is strapped close to the barrel to minimize parallax. The Reavis M2/M3 Subcaliber Device and the Payne Harness are modifications which permit the Brewster to be used with the BIFV. The Reavis modification of the Brewster Device compensates for both the superelevation difference between HEI-T and APDS-T ammunition, and the trajectory differences between these rounds and the trajectory of the 5.56 and the .22 caliber rounds. The Payne Harness is a modification which permits quick and safe installation of the electrical circuitry and insures that the commander and gunner cannot operate the system without following proper procedures. The Brewster/Reavis Device is mounted on the barrel of the 25 mm gun and it can accommodate either of two firing systems, the M16 rifle with or without the rimfire adapter, or the M55 laser. The rimfire adapter consists of a .22 caliber long rifle bolt which replaces the M16A1 bolt and carrier assembly. The device permits firing indoors or at short ranges, and is accurate in a semi-automatic mode up to 50 meters. The Reavis Device can also be used with the M16 rifle mounted and firing 5.56 ammunition. The M55 laser is a low powered helium-neon gas laser mounted in the Brewster Device. The low power pulse is reflected as a 5/8 inch red dot on a retroreflective target. Eye safe in the flashing mode, the M55 is focused up to 60 meters, and is effective up to 100 meters. When properly installed, the devices permit the gunner to practice aiming, tracking, ranging, responding to fire commands, and firing.

Telfare Device/Wallace Device/Magee Device

The M179 Telfare Device is mounted on the tank and permits the M2 .50 cal machinegun to be mounted on the tank main gun tube or front slope. Fired single shot with either .50 caliber ammunition or with subcaliber ammo and an adapter, the device permits accurate subcaliber gunnery to ranges of 1000 meters with either full or half-scale targets. There are some indications that it may also be used at ranges approaching 1600 meters. The Telfare Device is too heavy for the BIFV gun trunions and is therefore not suitable for use with the BIFV. Similarly, the Wallace Device permits the M85 machine-gun to be fired in a single shot mode from the M60 and M60A1 tank at ranges of

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up to 1000 meters. The Magee Device permits the M85 to be fired from the M60A2 tank at 1000 meters, and possibly up to 1600 meters. These devices permit full crew interactions for full and half-scale targets but neither of these devices is adaptable for the BIFV.

Stout Board/Scaled Range Target System (SRTS)

The Stout Board is a 2' x 6' magnetic plywood board covered with retro-reflective material and used with 1/2 inch targets and the M55 laser. The Stout Board is centered in front of a tank or BIFV main gun, and targets are positioned on the board to correspond to actual targets down range. As the commander and gunner engage distant targets, the laser beam strikes a spot on the magnetic board corresponding to the point of aim of the main gun. All crew duties except burst on target can be performed.

The Stout and other devices are used in conjunction with scaled ranges and scaled targets. SRTS refers specifically to modular, subcaliber, remote controlled tank target systems designed to provide hard targets for .22 caliber and 5.56 mm live fire, and retroreflective targets for the M55 laser gunnery trainer. Scaled targets are used with a simulated range of from 800 to 2500 meters and actual ranges from 25 to 40 meters. Single targets can be fired at from a stationary BIFV using the M55 and Stout Device, with the Brewster/Reavis with 5.56, .22 caliber or with the .22 caliber and rimfire adapter.

Small 1/20 scale ranges can be used with moving vehicles where smaller scale ranges are inappropriate; with smaller scale ranges the terrain changes too fast for the BIFV to use proper adjustment techniques. However, the 1/20 may not offer sufficient advantage over the smaller scale ranges as the vehicle must move at unrealistically low speeds to prevent the over-running of targets. When used, the 1/20 scale range and targets are appropriate for the Brewster, the 7.62 coax machinegun, the M55 laser, and can possibly be used for the .50 caliber gun.

Scaled ranges of 1/10 to 1/15 can be used to simulate ranges of from 1000 to 3000 meters, using impact targets and actual ranges of only 200 to 350 meters. They are especially useful for sustainment and trainup for units which do not have full scale ranges. Half scale ranges (1/2) can be used by either stationary or moving vehicles, and permit practice in ranging. Each of the types of scaled ranges and targets permits full crew duties to be trained. The turret can be manipulated, and gunners react to fire commands, identify targets, and fire in a realistic setting.

Scaled targets are used in conjunction with scaled ranges and are available in realistic friendly and threat configurations to correspond to the varying sizes of the scaled ranges (e.g., 1/30, 1/35, 1/60). These targets are useful in preliminary gunnery training for dry fire, target acquisition, and range determination, and are useful for range training with the M55 laser. Also available are scaled size radio controlled vehicles which can be used on scaled ranges for all aspects of gunnery except live fire.

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Plastic Ammunition

Plastic training ammunition (PTA) can be used with various training devices and the M16 rifle. PTA is also available for the .50 caliber and for .22 long tracer ammunition. PTA consists of a plastic cartridge case and bullet, with a metal primer and base. Improved plastic practice ammunition (PPA) has a plastic projectile and a metal cartridge case. Plastic ammo permits full crew live fire gunnery in training areas without fixed range facilities and on reduced scale ranges. It can also be used for MOUT due to its non-richocheting and non-fragmenting characteristics. The 5.56 round has a maximum range of 250 meters, with a maximum effective range of 30 meters. The .50 caliber PTA has a maximum range of 600 meters, and a maximum effective range of 150 meters.

LASER TRAINING DEVICES/FACILITIES

Multiple Integrated Laser Engagement System (MILES)/Laser Target Identification Device (LTID)/Full Crew Interactive Simulator (FCIS)/Through-the-Sight Video (TSV)

In the MILES training system, crews use real equipment and vehicles in a simulated OPFOR setting. Each participant vehicle, weapon or soldier is equipped with laser firing and sensing devices. Vehicles are killed only when engaged with a laser beam coded to represent a weapon which would actually kill the target. Kills are indicated by a flashing light on vehicles, and by a loud continuous buzzer on soldiers. The MILES weapon simulators for killed weapons are deactivated and will not fire again until reset by controllers. The MILES system, available for the BIFV, except for the firing port weapons, is not intended to serve as a gunnery trainer, but gives indications of hits and near misses, and provides assessment of exercises in a tactical situation. In the BIFV MILES system, the basic load of 25 mm ammunition is programmed at 1500 rounds; there are 4500 rounds of coax. Blank ammunition is fired, and both FLASHWESS weapons effects simulators and ATWESS (antitank weapons effects signature simulator) are used to increase training realism.

The laser target identification device provides laser sensing and control of IRETS and ARETS targets, thereby permitting MILES to be fired at stationary and moving targets. The Full Crew Interactive Simulator refers to a combination of training devices used in tank gunnery training. MILES and the Hoffman weapons signature simulator are used with the LTID system and the Through the Sight Video (TSV) device. TSV requires the insertion of an optical beam splitter in the visual path through the optical sight. The resulting optical output is fitted to a video camera and recorder and thereby permits the full recording of the gunner's sight picture and monitoring of the complete target search, acquisition, and engagement process. The TSV serves only to record the picture; feedback is dependent on instructor critique of the visual and audio record. TSV is in the initial stages of being adapted for use with the Bradley.

The National Training Center (NTC)

The National Training Center at Fort Irwin, California, is a FORSCOM and TRADOC sponsored facility which provides battalion task force combined arms

armor and mechanized infantry training which cannot be accomplished at home stations. The opponent is a highly trained threat force which uses threat vehicles, tactical doctrine, and has a great knowledge of the terrain. The MILES system is used to determine hits and kills, and all engagements (time, location, engaging elements and outcome) are stored for later analysis. The training unit commander and staff are provided immediate feedback by after-action review by the NTC Controllers. The training exercises provide detailed knowledge of weaknesses in unit missions, procedures, tasks and techniques in an environment which closely simulates actual battle conditions. The OPFOR is very skilled, and fights from actual captured vehicles or uses visual modification kits (VISMOD) which closely resemble threat vehicles. The VISMOD vehicles are full scale fiberglass mockups which are available only at the NTC. VISMODs of the T72, 122SP, ZSU, and BMP fit over the M551 Sheridan Tank, and the BRDM-2 VISMOD fits over the M882 truck. Although gunnery skills are important, the NTC is a training situation primarily designed to provide realistic force-on-force tactical training, with specific training in vehicle recognition, target acquisition and engagement, and intelligence play.

SAAB Scania BT-41/Tank Weapons Gunnery Simulation System (TWGSS)

The SAAB BT-41 is a precision laser gunnery device which is attached to a vehicle and, in combination with laser sensing devices on other vehicles, provides simulated firing of each of the vehicle's main weapons systems in force-on-force engagements. The eye-safe laser permits use of the full 360 degree range concept for gunnery training. Tested for tanks in the TWGSS, the SAAB coded laser beam simulates the trajectory of a projectile in real time and provides simulated tracer burn for the gunner in firing at single or multiple stationary or moving targets. The target simulator sensing devices evaluate whether a shot was a hit or a miss, and in the case of a kill, whether mobility or catastrophic. Targets can be programmed to require a particular number of shots before a kill is registered, or can be programmed to respond according to the location of each particular hit. Thus kills are determined by the actual probabilities of kill for the round and the locations of hits for each individual target. Documentation of all rounds fired and received from OPFOR vehicles is provided on a paper printout from the system's computer. Assessment measures include time, round type, rounds hit, rounds to kill, and exact distances in azimuth and elevation of each round from center of mass. The SAAB BT-41 is available for the BIFV. The SAAB BT-52T antitank guided missile simulator is similar in concept to the BT41 and is used for training TOW gunners.

Simfire

Simfire, a British laser device, is similar to MILES and SAAB BT-41. Weapons effects (fall of the round, flash generator) are simulated in the gunner's eyepiece, and a cam system moves the laser to compensate for main gun elevation and permit ranging. Kills and killed vehicles are simulated and different ammo types can be selected. Although mist, fog, and dust reduce the range, under normal visibility the Simfire device can be used from 400 to 2400 meters. Currently designed as a tank device, Simfire has not yet been adapted to the BIFV.

Tactical Light Shot Simulation (TALISSI)

The TALISSI is a German-made laser device similar to the SAAB BT-41 and Simfire. The coded laser provides precision gunnery or force-on-force tactical simulation for direct fire weapons including tanks, helicopters, and antitank missile systems. Muzzle flash and hits are simulated in real time, ammunition can be selected, and ranging accuracy can be measured. Performance can be displayed in console or printout form. TALISSI is available in several versions for the German Marder, antitank helicopters and guns, and reconnaissance vehicles, but is not currently available for the BIFV.

Bradley Gunnery and Missile Target System (BGMTS)

BGMTS is a soon-to-be-fielded version of TGMTS, the Tank Gunnery and Missile Target System by DETRAS. BTMTS is a main gun appended simulator which uses the BIFV in conjunction with a laser impact projector, a laser transmitter, an IR scanner, and a rear projection screen. During target engagement, the commander and gunner view a realistic filmed battle scene through the sight unit, and can engage either single or multiple targets. The scanner continuously monitors the gunner's aiming point. When the gun is laid on the target and the trigger is pulled, the transmitter emits an eye safe laser which tracks the trajectory of the round and simulates an explosion at the point of impact. The position of the round is shown during flight (tracer burn) and at impact. (The BGMTS/TGMTS is similar to, and an advancement of, an earlier DETRAS military film target system (MFTS) for tank gunnery which uses a small caliber projectile fired down range at a paper screen. The rear projection film scene provides realistic targets and the revolving paper screen stops and is illuminated at round impact to provide for scoring the round.) The BGMTS system is particularly useful for areas with limited range facilities as it is used indoors, and with a stationary vehicle. BGMTS can be used in 25 mm, coax, and TOW engagements.

SIMULATIONS

Videodisc Interactive Gunnery Simulator (VIGS)

The Perceptronics MK 2/3 is the BIFV version of the MK60 Part Task Gunnery Trainer (PTGT) or Videodisc Gunnery Trainer (VDGT) developed for tanks. The MK 2/3 is a part task, single station (gunner only) tabletop trainer consisting of a microcomputer, a TV monitor and videodisc player plus a mockup of the BIFV gunner's station and hand controls. The device presents filmed images of realistically camouflaged threat vehicles in various scenarios and degrees of motion. Targets are engaged using precision fire techniques or battlesight techniques, and gunners are taught correct use of burst on target. The trainee responds to auditory fire commands, practices correct sight picture, and gains experience in sensing rounds and tracking targets with the 25 mm, the coax, and the TOW missile system. Range can be determined using the stadia lines, and various combinations of weapons and ammunition can be selected. Noise levels, tracer burnout, correct ammunition trajectory and impact of rounds is also simulated for added realism. The device also

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provides for automatic scoring of hits, misses, and rounds fired, and sets time limits for each engagement. Successful target engagement stops the action and feedback is provided; unsuccessful attempts at engaging targets continue until the time limit has been reached. While admittedly only a part task trainer, the MK 2/3 can be used for sustainment gunnery and perhaps for inital gunnery training.

TANGA

The TANGA Classroom Tank Gunnery Trainer is a single station trainer developed by the Israeli Armor Corps Training Command. It is similar to the Perceptronics trainer, using film representation, a microcomputer and simulated optics with a realistic hand station. Main gun and machinegun engagements can be fired, using a choice of six ammunitions. The device is designed to improve target location, aiming accuracy and tracking, rapid firing, burst on target, and other standard firing techniques. The device permits error insertions, and simulates flash, recoil, smoke obscuration, and sounds of firing, in addition to round location and hits. With simulated ranges of from 1000 to 3000 meters, the TANGA is self-paced from simple gun lay to advanced tactical exercises. Acquisition time, firing time, and aiming corrections are monitored and knowledge of results is provided on screen. A printed output is also available, as are effects of weather and environment. Currently the TANGA has been designed only for tank gunnery training.

Simulated Tank Gunnery Trainer (STAGS)

STAGS is a generic gunnery trainer that will simulate a variety of antiarmor systems for initial and proficiency training. The initial system is being developed for the M47 Dragon (STAGS-D); the project is presently only in the initial stages of development.

Conduct of Fire Trainer (U-COFT, I-COFT, P-COFT)

The Unit-Conduct of Fire Trainer is being developed by General Electric as a precision gunnery trainer for tanks and for the BIFV. The Bradley U-COFT provides a high fidelity simulation of the Bradley turret and allows the BIFV gunner and commander to perform procedural functions. The U-COFT is a shelterized, deployable unit, consisting of a student station and a separate instructor's station, in addition to the computer related hardware. Full color computer generated imagery visual displays are presented through a simulated integrated sight unit, the unity window, and the commander's periscope and the BIFV hand stations are replicated for both positions. The battlefield scenes presented to the trainees include day and night views, and other weather-related conditions. The computer generated field of play is 3000 by 6000 meters and permits a free play engagement of single and multiple targets (vehicle and troops) in the simulated battlefield. Both moving and stationary targets are presented, and the COFT provides simulated own-vehicle motion when appropriate. Rounds (25 mm, coax, and TOW) are depicted realistically with correct trajectories, and if hostile targets are not engaged within preset

time limits, simulated enemy fire is received. Scenes presented vary in
complexity and level of difficulty throughout the training process as the
turret team increases its skill, but the instructor can vary the scenes or
freeze or repeat actions as necessary to tailor the instruction to the specific
team being trained. All records are kept by the computer, and performance
criteria are built into the system to help determine each team's level of
progress and speed of advancement through the exercises. Gunners are scored
on factors of weapon system selection, aiming accuracy, and actual target
engagement. The U-COFT, for unit training, will be the first BIFV COFT
fielded, followed by the I-COFT, which is intended to be used in institutional
training settings. The I-COFT will be similar to the U-COFT but will consist
of four separate COFTS joined together to provide a training facility for up
to four crews at the same time. The number of instructors per I-COFT has not
yet been determined, but may be able to be less than four. The P-COFT is
conceptualized as a device to teach platoon leaders gunnery and tactics, using
the I-COFT setup with freedom of maneuver. The platoon leader in his P-COFT
configuration would interact with the other three COFTs as he would in a
battlefield platoon. The P-COFT is still only in the conceptual stage of
development.

The Large Scale Simulation Network (LSS) (SIMNET) (ICATS)

The Integrated Combined Arms Training System is a large scale electronic
gaming simulation conceptualized to provide 300 or more simulation stations
using videodisc and computer generated graphics technology to simultaneously
train up to four battalions in a combined arms simulation. Sponsored by
DARPA, this multi-year state-of-the-art technological effort will provide
tactical training for multiple squad or platoon level elements in simulated
force-on-force situations. This simulation is designed to connect 1000
players at diverse locations and computer terminals performing in individual
BIFVs or tanks, or as dismounted troops. Logistical concerns are also included
and the intent is to provide as much fidelity as possible to the gaming
simulation. Not a gunnery trainer per se, the SIMNET configuration focuses on
tactical training and the combined arms emphasis. Included are aspects of
command and control training, including troop leading, coordination of logistical
trains, communications, and general organization. Opportunity is available
for performance of reconnaissance missions and provision for cover and conceal-
ment, and simple vehicle operation. Offensive and defensive operations and
tactics are included, as well as techniques of movement. Weapon employment
and maintenance, as well as provisions for keeping track of ammunition and
fuel expenditure are also programmed into the activities. Complex battlefield
scenarios are planned, including full crew interaction up to battalion level,
including command posts and with such elements as helicopters and fixed wing
aircraft as support elements. Still in the very early stages of development,
SIMNET is an ambitious and far-reaching development for tactical training.

Tactical Maneuver Simulation System (TACMASS)

TACMASS is based on technology contained in the German Army Automated Tank
Combat Simulation System (APKA). The system, currently under development for

the U.S. Army, will be used for tactical training at the platoon and company level. A computer based system, TACMASS consists of 22 blue force vehicle training stations, a main control station, a commander leader station, a combat support station, and a red threat station. A combined arms trainer, TACMASS will permit tactical maneuver simulation in an area 250x250 kilometers to an altitude of two kilometers. Offensive and defensive operations will be possible in both mounted and dismounted modes, with direct and indirect fire support. TACMASS will provide line of sight acquisition of targets, based on terrain, vehicle/unit status and visibility, and will employ realistic movement. TACMASS concept evaluation will take place in early 1986.

Company Team Level Tactical Simulation System (COLTSIM)

COLTSIM is a large scale simulation device which is being designed to develop and evaluate platoon and company proficiency in the conduct of tactical operations. Computer stations will accommodate players representing tank, infantry or scout platoons and company teams. Combat support and service support elements will also be represented in an interactive environment. Real time similation will provide both enemy and friendly activities under varying battlefield conditions and each of the weapons systems in a combined arms situation will be represented. Radio transmissions, ammunition and fuel status reports, equipment malfunction and personnel loss are some of the capabilities provided.

COLTSIM will be used to train tasks associated with tactical planning, assembly area operations, movement, offensive and defensive operations, passage of lines, and NBC operations. COLTSIM will be located in institutional settings, and in reserve components, and will serve armor and infantry. It can provide both initial and refresher training in all tactical operations. Still in the very early stages of development, COLTSIM is intended to be an institutional trainer providing coverage similar to the tactical training which will be provided to units by TACMASS.

Simulation in Combined Arms Training (SIMCAT)

SIMCAT is a computer based battle simulation for combined arms training. Still under development, SIMCAT provides a low-cost microcomputer network of interactive trainee stations, designed to simulate the activities of a U.S. tank platoon in tactical settings. The tank commander and his crew can move, shoot, communicate and navigate over varying terrain, engaging an OPFOR in a number of scenarios.

Information Required for Command and Control of Future Tank Platoons (IRC 2)

IRC 2 is a four phase study by the Human Engineering Lab to determine what amount of information will saturate the platoon leader to the point of ineffectiveness, and what type of information is beneficial for command and control. Preliminary work was begun using the German Tank Combat Simulator (APKA).

Vehicle Integrated Intelligence (V (INT)2)

V(INT)2 is conceptualized as a soldier/machine demonstrator using computer microprocessor techniques not only for corps and division staffs, but for commanders of small units that exchange fire with the enemy. This device, newly under development at Fort Knox, will enhance intelligence processing, battlefield identification friend or foe, and exploitation of terrain and firepower shock effect. It is an effort to provide the armor platoon leader with information regarding friendly and enemy forces and terrain, and other aspects of combat operations.

GAMES

Dunn Kempf

The Dunn Kempf Game consists of a three-dimensional scaled terrain board and miniature models of U.S. and threat tanks, armored personnel carriers, helicopters, and weapon systems in a European scenario. Miniature weapons are physically moved and fought by opposing force players according to the rules in a relatively free play situation. Training is provided in small unit tactics for company level and below. Also included are lessons in weapon system capabilities, proper employment of weapons, and the relation of terrain to such weapons. One controller is required, and eight players participate. Opposing forces are visually separated by a curtain. The game takes approximately 8 hours to play to simulate 20 to 25 minutes of actual combat.

Battle Analyzer and Tactical Trainer for Local Engagement (BATTLE)

BATTLE is a battalion task force computer assisted simulation with applications at company and platoon levels. It consists of a terrain board, miniatures, and a mini computer for bookkeeping and historical records. BATTLE teaches employment of different weapons systems, and the use of fire support systems, mines, and close air support.

Army Training Battle Simulation System (ARTBASS)

The Army Training Battle Simulation System (ARTBASS) designed to train command groups (battalion and brigade commanders and staffs) is a product improvement of the Combined Arms Tactical Training Simulator (CATTS). CATTS was designed to simulate the actions of units in combat. It calculates intervisibility and detection between forces, weapon to target range, and the effects of all engagements. ARTBASS is an improved model of CATTS. Players are battalion commanders and their command groups, and the roles of subordinate and attached unit commanders, fire support coordinators, etc., are played by "role players." ARTBASS is a two-van portable, computer driven two-sided fire play in real time battle simulation. A flexible digitized terrain base provides activities for a U.S. battalion and combat support, combat service support, air and air defense units, playing against a motorized rifle regiment or division. It trains maneuver battalion command groups to attain and sustain ARTEP standards in command and control, and in coordination of combined arms operations in a simulated environment against a realistic enemy force.

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Pegasus

Pegasus is a command post control system which employs a free play manual simulation. Battalion or brigade commanders and their staffs practice control and coordination of combined arms operations. Pegasus can be used by a single battalion command group, or for simultaneous execution by up to three battalion command groups and a brigade command group. A control group representing subordinate units, adjacent units, and higher headquarters employs simulation to generate combat reports, results and battle outcomes. The control group personnel execute operations on enlarged map sheets superimposed with hexagonal grids. Rules govern movement, fires, observation, and other aspects of combat. Unit markers are moved in accordance with the simulation rules and the schemes of maneuver developed by the brigade and battalion command groups. Tactical radios and wire nets are also included in operations. Training time covers 8 to 12 hours, and players can perform offensive and defensive operations on a European terrain board for an unlimited time period. At battalion level, 13 to 23 players participate; at brigade level, there are from 36 to 63 players.

First Battle

First Battle provides division command groups with the opportunity to control and coordinate combined arms operations in simulated tactical environments against an appropriate opposing force. It trains division command groups and staffs to sustain ARTEP standards. The scenarios involve armored divisions fighting unit against unit opposing threat tank armies. Playing time is 48 hours.

First Battle: Battalion-Corps

First Battle: Battalion-Corps replaces three other games, First Battle, Pegasus, and War Eagle (First Battle at Corps level). It is a manual simulation to exercise commanders and their staffs in realistic command post exercises at battalion through corps level. It trains unit commanders and staffs in control and command of combined arms exercises within a simulated environment against a realistic enemy force and evaluates a unit's tactical SOP. A large number of players and controllers are employed, with long training times and playing times required.

Computer Assisted Map Maneuver Simulation (CAMMS)

CAMMS provides tactical training for commanders and staffs at brigade and battalion level. Infantry, armor and cavalry regiments with combat support and combat service support elements oppose the enemy. A computer reduces map maneuver time and provides fast, accurate, objective results and a historical record. The CAMMS can be played from platoon level up, with all supporting elements. The degree of success of a unit depends on the soundness of its plans and their limitations, and on the decisions and orders of commanders

and staffs. CAMMS requires 4 to 6 hours of training time before an eight hour minimum playing time. At battalion level, players include the commander, the XO (or 1st sergeant), and the FIST for each letter company.

Administration Module (ADMINMOD)

ADMINMOD is a game for the battalion and brigade S1 to set up and operate a battalion command post. It trains personnel management, strength accounting, casualty reporting, and replacement requests. It is designed to enhance the training of battalion and brigade S1s and company personnel and entails interaction between the S1 and S4 at battalion and brigade levels.

Logistics Module (LOGMOD)

The LOGMOD entails maneuver of the battalion S4 and his support and company personnel in battalion and brigade operations. The S4 trains in keeping track of and managing equipment and supplies. LOGMOD covers loads, vehicles, and TO & E and POL data, as well as operations of field and company trains, supply, maintenance, and recovery missions.

Blockbuster

Blockbuster is a manual battle simulation to teach company leaders to plan offensive and defensive operations and to conduct MOUT. A combined arms scenario uses supporting artillery, attacking helicopters, close air support, air defense artillery, and engineers. A three dimensional terrrain board represents a village in Germany where a U.S. company team engages a reinforced motorized rifle battalion. There are 14 sections to the terrain board, with miniature vehicles, weapons systems, buildings, and rubble. Rules of play and movement and combat result tables are provided. Blockbuster trains company commanders and platoon leaders in planning and conducting operations in a typical village. Three hours of training time is required for each of the fifteen players, two to three controllers are required, and play lasts approximately eight hours.

The Tanker Game

The Tanker Game teaches small unit commanders and tank crews basic tank knowledge. Two, four or six players complete lesson packets covering ammunition, range finders, computers and gunner's periscope (M60A1 tank) using a terrain board. Players are issued scale model tanks as maneuver pieces, and use dice for maneuvering, and answer questions from cards within each lesson packet. Although not specifically designed to teach armor tactics, the game rewards players who use techniques involving hull or turret defilade positions, or who maximize vehicle firepower or mobility.

Battalion Staff Game

The Battalion Staff Game teaches staff procedures and application of tactics and fire support through gaming simulation. Players interact by answering questions on tactics, doctrine, staff functions, and weapons employment at battalion level. Effective planning, coordination and interaction are taught for two or more players on a terrain board. OPFOR orders are given, with player pieces in maneuver units in a question and answer format.

Miniature Armor Battle (MAB)

A tank game, MAB utilizes miniature and a terrain board to teach weapon system capablities, employment of weapons, and relation of terrain to weapons in a simulation environment.

Bookshelf Games

A series of games has been made commercially available by the Avalon-Hill Company and others. These games use boards and playing pieces and a variety of scenarios with varying weapons and rules. The games, designed to be played over a relatively long time period, consist of such varied titles as Squad Leader, the Arab-Isreali War, TOBROK, 1776, Panzerblitz, D-Day, and Gettysburg.

OThER DEVICES AND TRAINING AIDS

Electronic Instructional Delivery System (EIDS)

EIDS is not a specific training device, but is an advanced training delivery technology composed of a number of sophisticated components. Designed to be the Army's "Interactive Videodisc System," EIDS consists of a microcomputer, a videodisc player, some form of interactive device(s), and a display device or monitor. EIDS is applicable to a wide range of simulations, from simple part task training to complex integrated job performances. EIDS technology is particularly applicable to training which requires decisions encompassing a wide variety of tasks. EIDS technology has not yet been applied to Bradley training.

Location of Misses and Hits (LOMAH)

LOMAH is a projectile locating system which can be mounted on any existing target system. LOMAH detects the location of a projectile passing the plane of the target and provides direct feedback to the firing line through a video display of the exact location of the projectile. Multiple sensors, located on the target base, detect the shock waves of the projectile passage and translate the wave arrival times into location coordinates. The detection range around the target is dependent on the number and nature of the sensors located at the specific target. The projectile's passage coordinates are displayed on a console or printout in relation to an image of the target, and hit position and errors in elevation and azimuth are displayed. There is a replay opportunity for the last series of shots. LOMAH provides location information to assist a gunner in correcting aiming point, and may be useful in zeroing. LOMAH is not yet available for the BIFV.

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Eye Safe Simulated Laser Rangefinder (ESSLR)

For training use with tanks which use non-eye-safe laser range finders, the ESSLR has two types of filters. One provides relative safety for training purposes; the others provide total eye safety for simulated force-on-force engagements.

Beale Flare Simulator

The Beale Flare Simulator is a simple device used for scaled range night firing. An extension light from a M577 provides an overhanging indirect flare illumination on 1/60 and 1/35 scale ranges.

Automatic Weapons Effects Signature Simulator (AWESS), Antitank Weapons Effects Signature Simulator (ATWESS), FLASHWESS

AWESS provides aural and visual cues simulating a variety of weapons. It replicates the weapons system rate of fire by electronically igniting an oxygen and methane gas. The AWESS will substitute for the Hoffman Device. FLASHWESS provides a light flashing 120 times per minute to simulate gunfire; ATWESS simulates TOW and other antitank weapon signatures. These signature simulators are used in conjunction with the MILES system.

Sony TV Rover

The Sony TV Rover consists of a portable camera, television, and cassette tape recorder which enables units or trainers to make their own films of training situations for immediate replay feedback to trainees.

Driver Trainer

The Driver Trainer was designed to provide initial through sustainment training for drivers of a variety of vehicles. Various terrains and weather conditions are provided, as well as opportunities for malfunctions. The device consists of a driver's compartment mounted on a motion system and a scaled terrain model in an individual computer controlled station. The driver trainer is not currently in production.

M1 Driver Trainer

The M1 driver trainer consists of five driver stations and one instructor station, with the M1 driver's station area duplicated. It is a procedures trainer to teach appropriate action as simulated routine and emergency situations are presented. The trainee drives his vehicle on a course presented in his

periscope from a video tape fed TV screen. He is scored on maintaining his vehicle on course and responding to situations. Although promising as a trainer, the M1 driver trainer was found not to be cost effective.

Remote Controlled Mobile Air Target (RMCAT)

The RMCAT is a self-propelled model aircraft which is used to train small arms gunners to engage moving aircraft. RMCAT consists of an airplane with a light styrofoam body and wings with a metal engine. Successful target engagement requires a direct hit to the engine portion. The cost of using RMCAT is high because air engagements require a high volume of fire massed at the target. Often range fan limitations limit use to less than main gun firing.

M70 TOW Trainer

The M70 TOW trainer is used to simulate firing and tracking of TOW missile systems. It is crew-portable, and permits training on tracking for initial instruction, practice and qualification. The sights are not compatible with the BIFV.

M1, M2/M3 Maintenance Trainer

The Maintenance Trainer is a panel trainer which offers organization and direct support maintenance capability. It offers a computer, printer, CRT and viewer to teach maintenance through simulation. Faults are induced by the instructor; the student troubleshoots a panel which provides correct symptoms (warning lights, sounds, voltages) for the malfunction simulated.

Tank Turret Organizational Maintenance Trainer (TTOMT)

The TTOMT teaches organizational maintenance personnel correct procedures using simulated computer driven STE-M1, a multimeter, and breakout box for the testing and removal of simulated M1 turret components. The M1 is presented in a see-through configuration. Similar trainers are being developed for the M2/M3 for organizational and direct support maintenance.

Battlefield Identification Friend or Foe (BIFF) Thermal Sight Trainer

The BIFF trainer is a vehicle identification trainer which uses miniature models of target vehicles moving on a rotating terrain board. Reflective paint is applied to target areas which would be seen as warm in a thermal mode. Trainees view the targets through a rifle scope with variable magnification available.

Worm Board/Snake Board

The worm board consists of a large board on which parallel lines have been painted in configurations of straight lines and curves to permit practice in tracking and manipulation. The standard board has a pair of black lines in angles, and a second pair of curving lines. The gunner must keep the reticle in the space between the parallel lines and must track quickly and accurately in the power mode from both the commander's and gunner's stations, and in the manual mode from the gunner's station. The newly developed Burnett board with a retroreflective surface and red lines utilizes the M55 laser to provide instant feedback for the student and instructor.

Other Aids

Films/slides/flashcards
Terrain Models and Boards/Cloth Boards
Miniature vehicles/static and remote controlled
Maps/printed material
Bessler Cue See/TEC Lessons
Platform classroom instruction
Terrain model exercises
Tactical drill exercises
Terrain exercises
Map exercises
TEWT tactical exercise without troops
FTX field treaining exercises
CPX command post exercises
CALFEX combined arms life fire exercises

PLATOON LEADER TASKS

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	
6	2	3	3	2	1	1	2	1	Establish assembly area security: locations, defensive, physical, light, noise, commo
6	2	2	2	2	1	1	3	1	Establish communication: wire net, visual, auditory, radios, etc.
6	2	2	2	2	1	1	3	1	Establish SOP for reporting (SITREP, SPOTREP)
12	4	3	3	2	2	2	2	1	Assign assembly area positions: weapons and vehicles
18	6	3	2	2	2	1	3	3	Supervise PMCS vehicles and weapons
12	8	2	2	2	2	2	3	2	Recon assembly area
8	4	2	3	2	0	1	4	2	Perform precombat inspection of personnel: leaders, key weapons, individual needs
18	4	3	3	2	2	1	3	2	Perform precombat inspection of vehicles: completion of PMCS, fuel tanks, deficiencies reported
36	12	3	3	2	3	2	4	3	Perform precombat inspection of weapons: inspect 25mm gun, coax, TOW, FPW, individual weapons
18	4	2	3	2	2	2	3	1	Inspect combat loading of vehicles
16	4	2	2	2	2	2	4	1	Practice battledrills: movement, change formations, maintain security at a halt
12	8	2	2	2	2	2	3	2	Supervise terrain driving: navigation, routes, evaluate trafficability, cross bridges, cross water, use cover and concealment
6	4	2	2	2	1	2	3	1	Supervise safe driving procedure: order, speed, intervals, visual contact, formations, positions, start/stop signals, utilize night vision devices
24	6	2	3	2	2	1	4	1	Maintain security during movement: 360 degree observation, weapon ready posture, turret orientation, target priorities, vehicle positions, air guard, blackout
4	4	2	2	2	2	1	1	1	React to vehicle breakdown during tactical movement

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	PLATOON LEADER TASKS
8	4	2	2	2	2	2	2	1	Breach obstacles: mounted or dismounted, manmade, natural
4	4	2	2	2	1	1	2	1	Use smoke: kinds of smoke, effects of darkness, weather, terrain
24	8	2	3	2	2	2	4	2	Deploy a dismount team:
24	4	2	3	2	2	2	4	1	Use proper vehicle position
16	4	2	2	2	2	1	4	2	Provide covering force
16	4	2	2	2	2	1	4	2	Exit and remount method, speed and order
8	8	2	2	2	1	2	4	2	Provide commo signals for dismount team
8	4	2	2	1	1	2	4	2	Issue dismount alert – weapons, helmets, personnel
8	4	2	2	2	1	1	4	2	Prepare firing port weapons
8	4	2	2	2	1	1	4	2	Monitor use of MOPP
6	4	2	2	2	1	2	3	1	Specify dismount team leader
16	4	2	2	2	2	2	4	1	Remount casualties and equipment
8	4	2	2	1	1	2	4	2	Assign ground positions to dismount team
8	2	2	2	1	1	2	4	1	Lead fire and maneuver, traveling and bounding
16	8	2	2	2	2	2	4	2	Assign sectors, targets, priorities
16	8	2	2	2	2	2	4	2	Maintain commo
9	2	2	3	1	1	1	3	2	Maintain security, overhead cover, concealment
9	8	2	3	2	1	2	3	2	React to direct and indirect fire
18	8	3	3	2	3	2	2	2	React to directed energy weapon threat: Protect personnel, vision devices, electrical equipment, avoid detection (cover, concealment, smoke) shoot and move
12	6	3	3	2	2	2	2	1	React to nuclear threat: Procedures warned, unwarned; safeguard vehicle, engine, vision, commo devices; protect water, food, and personnel; use decontamination procedures
6	4	3	3	2	1	2	2	1	React to chemical threat: Protect personnel, maintain MOPP; decontamination procedures, treat and evacuate casualties
12	6	3	3	2	2	2	2	1	React to air attack: Early warning system, air guard, cover and concealment, use smoke; high volume of fire, use lead

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	PLATOON LEADER TASKS
12	8	2	3	2	2	2	2	2	React to direct fire and indirect fire:
12	8	2	3	2	2	2	2	2	Return fire with appropriate weapons
4	4	2	2	2	1	1	2	2	Call for, lift or shift indirect fires
6	4	2	2	2	1	1	3	2	Seek cover, move to alternate positions
8	8	3	2	2	2	2	2	2	Report to higher headquarters
12	8	2	3	2	2	2	2	2	Suppress ATGM gunner and avoid missiles by driving techniques
12	8	2	3	2	2	2	2	2	Use fire control measures, concentrated or distributed
8	8	2	2	2	2	2	2	2	Use patterns of fire (depth, crossfire, frontal)
12	4	2	2	2	2	1	3	2	Use fire commands
12	4	2	2	2	2	1	3	2	Utilize effective range of weapons
8	4	2	2	2	2	1	2	2	Monitor ammo status for each weapon
12	8	2	2	2	2	2	3	2	Identify target type, number, motion, priority, ammo type
6	8	2	2	2	1	2	3	2	Assign targets to vehicles
12	8	2	3	2	2	2	2	2	React to emergency - fire on vehicle
8	4	2	2	2	2	2	2	1	React to emergency - commo failure
8	8	2	2	2	2	2	2	2	React to electrical failure
6	4	2	2	2	3	2	1	1	React to ISU failure - day
9	2	3	2	1	3	2	1	1	React to ISU failure - limited visibility conditions
4	4	2	2	2	2	2	1	1	React to suspension system failure
4	4	2	2	2	2	2	0	1	React to major vehicular problem (mired, overturned, out of POL)
18	8	3	3	2	3	2	2	2	React to weapon malfunction, 25mm gun: troubleshoot, misfire procedure hot, cold gun, reload
18	8	3	3	2	3	2	2	2	React to weapon malfunction, coax machinegun: troubleshoot, misfire procedure hot, cold gun, reload
18	8	2	3	2	3	2	2	2	React to weapon malfunction, TOW: troubleshoot, TOW test failure, abort, misfire procedure
8	8	2	2	2	2	2	2	2	React to weapon malfunction, smoke grenade launcher: troubleshoot, misfire procedure

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	PLATOON LEADER TASKS
12	4	2	2	1	3	2	2	2	React to weapon malfunction, firing port weapon: troubleshoot, immediate action, vent fan failure
4	2	2	2	1	1	1	2	2	Issue orders:
6	4	2	3	2	1	1	2	2	Receive orders from superior - analyze mission, begin estimate
4	2	2	2	1	1	1	2	2	Issue a warning order - mission, time, movement to assembly area: specify time and place of OPORD
4	4	2	2	1	0	2	2	2	Make a tentative plan - concept
4	4	2	2	1	0	2	2	2	Perform recon of area
4	2	2	2	1	1	2	2	1	Complete plan - develop scheme of maneuver and fire support plan
6	2	2	3	1	1	1	2	2	Issue OPORD/FRAGO:
6	4	2	3	2	1	1	2	2	Describe situation
4	2	2	2	1	1	1	2	2	State mission
4	2	2	2	1	1	1	2	2	State scheme of maneuver
4	2	2	2	1	1	1	2	2	Specify fire support
4	2	2	2	1	1	1	2	2	State missions for subordinates
4	4	2	2	2	1	1	2	2	Describe service support
4	4	2	2	2	1	1	2	2	Establish command and signal
4	2	2	2	1	1	1	2	2	Supervise precombat operations - rehearsals, inspect for mission essential equipment, subordinate knowledge of mission
12	4	3	3	2	2	2	2	1	Conduct a movement to contact: timing (start time, arrival at LD), formations, technique of movement, combined arms mix, axis of advance
6	4	3	3	2	1	1	2	2	Cross line of departure - coordinate between units, ready posture
12	8	2	3	2	1	2	4	2	Take action on contact: develop the situation, choose course of action, report
12	4	3	3	2	1	2	4	1	Attack: Determine mounted or dismounted
24	8	2	3	2	2	2	4	2	Use direct fire, specify weapons
12	4	2	3	2	1	2	4	1	Assign targets, sectors, priorities
12	8	2	3	2	1	2	4	2	Call for indirect fire support
12	8	2	3	2	1	2	4	2	Request, lift or shift indirect fire

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TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	PLATOON LEADER TASKS
12	8	3	3	2	1	2	4	2	Reach the objective: specify limit of advance, initiate exploitation, pursuit; apply direct pressure force, encircle
12	4	2	3	2	1	2	4	1	Consolidate: Re-establish security
9	4	2	3	2	1	2	3	1	Fill key leadership positions
12	4	3	3	2	1	2	4	1	Man key weapon positions
12	4	2	3	2	1	2	4	1	Redistribute ammo and supplies
12	4	2	3	2	1	2	4	1	Clean up pockets of resistance
12	8	2	3	2	1	2	4	2	Designate sectors, positions
12	8	2	3	2	1	2	4	2	Clear fields of fire, OCOKA
12	8	2	3	2	1	2	4	2	Plan supporting fires, emplace obstacles
9	8	2	3	2	1	2	3	2	Occupy defensive positions:
9	4	2	3	2	1	1	3	2	Establish security
9	4	2	3	2	1	1	3	2	Recon the area
9	4	2	3	2	1	1	3	2	Select vehicle and automatic weapon positions
9	4	2	3	2	1	1	3	2	Mark and improve positions, dig in
9	4	2	3	2	1	1	3	2	Assign sectors of fire
9	4	2	3	2	1	1	3	2	Clear fields of fire
9	8	2	3	2	1	2	3	2	Identify enemy avenues of approach
9	4	2	3	2	1	1	3	2	Identify key terrain
9	4	2	3	2	1	1	3	2	Prepare cover, concealment, camouflage-ground and air
9	8	2	3	2	1	2	3	2	Prepare alternate and supplementary positions:
9	4	2	3	2	1	1	3	2	Recon the area
9	4	2	3	2	1	1	3	2	Select and improve positions
9	2	2	3	1	1	1	3	2	Clear routes, rehearse movement
9	8	2	3	2	1	2	3	2	Make range cards, sector sketches, platoon overlays: Vehicle positions, weapons and range
9	4	2	3	2	1	1	3	2	Dismount positions, weapons and range
9	4	2	3	2	1	1	3	2	Sectors of fire (primary, secondary)
9	4	2	3	2	1	1	3	2	Range to FPL, PDF
9	4	2	3	2	1	1	3	2	Terrain features, TRPs, EA
9	4	2	3	2	1	1	3	2	Dead space
9	4	2	3	2	1	1	3	2	Obstacles
6	2	2	2	1	1	1	3	2	Coordinate fire support plan: Locate targets (coordination points, FEBA, EA, TRP)
9	2	2	3	1	1	1	3	2	Call for indirect fire (timing, type)
6	2	2	2	1	1	1	3	2	Call for adjustment of indirect fire
18	6	2	2	2	3	1	3	3	Arrange for coverage of obstacles

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	PLATOON LEADER TASKS
9	2	2	3	1	1	2	3	1	Coordinate between adjacent positions:
9	4	2	3	2	1	2	3	1	Sectors of fire
9	4	2	3	2	1	2	3	1	Location of dead space between units
9	4	2	3	2	1	2	3	1	Location of OPs
9	2	2	3	2	1	1	3	1	Placement of dismount teams
9	4	2	3	2	1	2	3	1	Plan coverage of obstacles
9	2	2	3	2	1	1	3	1	Maintain intervisibility
9	4	2	3	2	2	2	3	1	Identify patrols (size, type, timing, routes)
9	4	3	3	2	1	1	3	2	Conduct the defense:
18	8	2	3	2	2	2	3	2	Maintain fire distribution and control
9	8	2	3	2	1	2	3	2	Defend against long range targets
9	4	2	3	2	1	1	3	2	Defend against close in targets
9	4	2	3	2	1	2	3	1	Assign targets
9	4	2	3	2	1	2	3	1	Specify distributed vs. concentrated fire
9	2	2	3	2	1	1	3	1	Specify type of fire (crossfire, frontal, depth)
9	2	2	3	2	1	1	3	1	Assign area coverage, responsibility
9	2	2	3	2	1	1	3	1	Maintain turret orientation, ready posture
9	2	2	3	2	1	1	3	1	Specify ammo type for combat load
6	4	2	3	2	1	2	2	1	Supervise movement to supplementary and alternate positions
6	6	2	3	2	0	3	2	1	Conduct retrograde operations:
6	4	2	3	2	1	2	2	1	Conduct a delay
4	2	2	2	1	1	2	2	1	Conduct a withdrawal, not under pressure
3	2	2	3	2	1	1	1	1	Conduct a withdrawal, under pressure
2	1	2	2	1	1	2	1	1	Conduct a retirement
2	2	2	2	1	1	2	1	1	Use timing in retrograde operations
3	4	2	3	2	1	2	1	1	Maintain security
3	4	2	3	2	1	2	1	1	Use deception
18	4	2	3	2	3	2	2	1	Use a DLIC
6	4	2	3	2	1	2	2	1	Plan fire support
4	4	2	2	2	1	2	2	1	Assign initial and subsequent positions
6	4	2	3	2	1	2	2	1	Conduct movement and choose routes
6	2	2	3	2	1	1	2	1	Reorganize personnel:
6	2	2	3	2	1	1	2	1	Make proper disposition of casualties (move, treat, evacuate)
6	2	2	3	2	1	1	2	1	Fill key leadership positions
6	2	2	3	2	1	1	2	1	Fill crew-served weapon positions
4	2	2	2	2	1	1	2	1	Send POWs to collection point
6	2	2	3	2	1	1	2	1	Rest and feed troops
6	1	2	3	1	1	1	2	1	Request replacements
18	8	2	3	2	2	2	3	2	Prepare weapons:
18	8	2	3	2	2	2	3	2	Troubleshoot, perform PMCS
18	8	2	3	2	2	2	3	2	Reload, redistribute ammo
12	4	2	3	2	2	1	2	2	Request ammo resupply

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	PLATOON LEADER TASKS
18	8	2	3	2	2	2	3	2	Prepare vehicles and equipment:
18	2	2	3	2	2	2	3	2	Troubleshoot, perform PMCS
6	2	2	3	1	1	1	2	2	Redistribute supplies
6	2	2	3	1	1	1	2	2	Request supplies, POL
9	2	2	3	1	1	1	3	2	Make repairs
9	2	2	3	2	1	1	3	1	Refuel
6	2	2	2	1	1	1	3	2	Submit status report: Indicate situation (location, position, estimate)
6	2	2	2	1	1	1	3	2	Report on personnel (casualties, wounded, missing)
6	2	2	2	1	1	1	3	2	Report on vehicles and equipment (POL, ammo, supplies on hand and needed)
9	4	2	3	2	1	1	3	2	Reconstitute the defense or prepare for the next attack: Re-establish security
6	4	2	2	2	1	1	3	2	Re-establish commo
9	4	2	3	2	1	1	3	2	Reposition vehicles, personnel, weapons
6	4	2	2	2	1	1	3	2	Cover sectors of fire
6	4	2	2	2	1	1	3	2	Replace camouflage and obstacles
6	4	2	2	2	1	1	3	2	Coordinate with adjacent units

COMPANY COMMANDER LEADER TASKS

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	
3	1	1	1	1	0	1	3	1	Establish assembly area security: locations, defensive, physical, light, noise, commo
-	-	-	-	-	-	-	-	-	Establish communication: wire net, visual, auditory, radios, etc.
-	-	-	-	-	-	-	-	-	Establish SOP for reporting (SITREP, SPOTREP)
-	-	-	-	-	-	-	-	-	Assign assembly area positions: weapons and vehicles
-	-	-	-	-	-	-	-	-	Supervise PMCS vehicles and weapons
-	-	-	-	-	-	-	-	-	Recon assembly area
-	-	-	-	-	-	-	-	-	Perform precombat inspection of personnel: leaders, key weapons, individual needs
-	-	-	-	-	-	-	-	-	Perform precombat inspection of vehicles: completion of PMCS, fuel tanks, deficiencies reported
-	-	-	-	-	-	-	-	-	Perform precombat inspection of weapons: inspect 25mm gun, coax, TOW, FPW, individual weapons
-	-	-	-	-	-	-	-	-	Inspect combat loading of vehicles
-	-	-	-	-	-	-	-	-	Practice battledrills: movement, change formations, maintain security at a halt
3	2	1	1	1	1	2	3	1	Supervise movement
-	-	-	-	-	-	-	-	-	Supervise terrain driving: navigation, routes, evaluate trafficability, cross bridges, cross water, use cover and concealment
-	-	-	-	-	-	-	-	-	Supervise safe driving procedure: order, speed, intervals, visual contact, formations, positions, start/stop signals, utilize night vision devices
-	-	-	-	-	-	-	-	-	Maintain security during movement: 360 degree observation, weapon ready posture, turret orientation, target priorities, vehicle positions, air guard, blackout
-	-	-	-	-	-	-	-	-	React to vehicle breakdown during tactical movement

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	COMPANY COMMANDER LEADER TASKS
-	-	-	-	-	-	-	-	-	Breach obstacles: mounted or dismounted, manmade, natural
-	-	-	-	-	-	-	-	-	Use smoke: kinds of smoke, effects of darkness, weather, terrain
12	8	2	2	2	2	2	3	2	Deploy a dismount team:
-	-	-	-	-	-	-	-	-	Use proper vehicle position
-	-	-	-	-	-	-	-	-	Provide covering force
									Exit and remount method, speed and order
-	-	-	-	-	-	-	-	-	Provide commo signals for dismount team
-	-	-	-	-	-	-	-	-	Issue dismount alert - weapons, helmets, personnel
-	-	-	-	-	-	-	-	-	Prepare firing port weapons
-	-	-	-	-	-	-	-	-	Monitor use of MOPP
-	-	-	-	-	-	-	-	-	Specify dismount team leader
-	-	-	-	-	-	-	-	-	Remount casualties and equipment
-	-	-	-	-	-	-	-	-	Assign ground positions to dismount team
-	-	-	-	-	-	-	-	-	Lead fire and maneuver, traveling and bounding
-	-	-	-	-	-	-	-	-	Assign sectors, targets, priorities
-	-	-	-	-	-	-	-	-	Maintain commo
-	-	-	-	-	-	-	-	-	Maintain security, overhead cover, concealment
-	-	-	-	-	-	-	-	-	React to direct and indirect fire
6	8	2	2	2	1	2	3	2	React to enemy threat
9	8	2	3	2	1	2	3	2	React to directed energy weapon threat: Protect personnel, vision devices, electrical equipment, avoid detection (cover, concealment, smoke) shoot and move
6	8	2	2	2	1	2	3	2	React to nuclear threat: Procedures warned, unwarned; safeguard vehicle, engine, vision, commo devices; protect water, food, and personnel; use decontamination procedures
6	8	2	2	2	1	2	3	2	React to chemical threat: Protect personnel, maintain MOPP; decontamination procedures, treat and evacuate casualties
6	8	2	2	2	1	2	3	2	React to air attack: Early warning system, air guard, cover and concealment, use smoke; high volume of fire, use lead

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	COMPANY COMMANDER LEADER TASKS
9	4	2	3	2	1	1	3	2	React to direct fire and indirect fire:
9	8	2	3	2	1	2	3	2	Return fire with appropriate weapons
12	8	2	3	2	1	2	4	2	Call for, lift or shift indirect fires
6	8	2	2	2	1	2	3	2	Seek cover, move to alternate positions
8	4	2	2	2	1	1	4	2	Report to higher headquarters
-	-	-	-	-	-	-	-	-	Suppress ATGM gunner and avoid missiles by driving techniques
16	8	2	2	2	2	2	4	2	Use fire control measures, concentrated or distributed
16	8	2	2	2	2	2	4	2	Use patterns of fire (depth, crossfire, frontal)
16	8	2	2	2	2	2	4	2	Use fire commands
18	8	2	3	2	2	2	3	2	Utilize effective range of weapons
6	4	2	2	1	1	2	3	2	Monitor ammo status for each weapon
16	8	2	2	2	2	2	4	2	Identify targets type, number, motion, priority, ammo type
-	-	-	-	-	-	-	-	-	Assign targets to vehicles
12	8	2	3	2	1	2	4	2	Coordinate with FIST Chief, team
16	4	2	2	1	2	2	4	?	React to emergencies on vehicles
-	-	-	-	-	-	-	-	-	React to emergency - fire on vehicle
-	-	-	-	-	-	-	-	-	React to emergency - commo failure
-	-	-	-	-	-	-	-	-	React to electrical failure
-	-	-	-	-	-	-	-	-	React to ISU failure - day
-	-	-	-	-	-	-	-	-	React to ISU failure - limited visibility conditions
-	-	-	-	-	-	-	-	-	React to suspension system failure
6	4	2	2	1	1	2	3	2	React to major vehicular problem (mired, overturned, out of POL)
18	8	3	2	2	2	2	3	2	React to weapon malfunction
-	-	-	-	-	-	-	-	-	React to weapon malfunction, 25mm gun: troubleshoot, misfire procedure hot, cold gun, reload
-	-	-	-	-	-	-	-	-	React to weapon malfunction, coax machinegun: troubleshoot, misfire procedure hot, cold gun, reload
-	-	-	-	-	-	-	-	-	React to weapon malfunction, TOW: troubleshoot, TOW test failure, abort, misfire procedure
-	-	-	-	-	-	-	-	-	React to weapon malfunction, smoke grenade launcher: troubleshoot, misfire procedure

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	COMPANY COMMANDER LEADER TASKS
-	-	-	-	-	-	-	-	-	React to weapon malfunction, firing port weapon: troubleshoot, immed. action, vent fan failure
12	2	3	3	2	1	1	4	1	Issue orders:
6	1	2	2	1	0	1	3	1	Receive orders from superior - analyze mission, begin estimate
8	2	2	2	2	1	1	4	1	Issue a warning order
6	2	2	2	2	1	1	3	1	State mission, time, movement to assembly area: specify time and place of OPORD
6	2	2	2	2	1	1	3	1	Make a tentative plan - concept
6	2	2	2	2	1	1	3	1	Perform recon of area
6	2	2	2	2	1	1	3	1	Complete plan - develop scheme of maneuver and fire support plan
9	2	3	3	2	1	1	3	1	Issue OPORD/FRAGO:
6	2	2	2	2	1	1	3	1	Describe situation
6	2	2	2	2	1	1	3	1	State mission
6	2	2	2	2	1	1	3	1	State scheme of maneuver
6	2	2	2	2	1	1	3	1	Specify fire support
6	2	2	2	2	1	1	3	1	Type/kind of support
6	2	2	2	2	1	1	3	1	Antiarmor plan
6	2	2	2	2	1	2	3	1	Restrictions
9	2	3	3	2	1	1	3	1	State missions for subordinates
9	2	3	3	2	1	1	3	1	State special instructions/control/restrict.
8	2	2	2	2	1	1	4	1	Describe service support
6	4	2	2	2	1	2	3	1	Establish command and signal
6	1	2	2	1	1	1	3	1	Supervise precombat operations - rehearsals, inspect for mission essential equipment, subordinate knowledge of mission
6	4	2	2	1	1	2	3	2	Conduct a movement to contact: timing (start time, arrival at LD), formations, technique of movement, combined arms mix, axis of advance
6	4	2	2	1	1	2	3	2	Cross line of departure - coordinate between units, ready posture
12	8	2	3	2	1	2	4	2	Take action on contact: develop the situation,
8	8	2	2	2	1	2	4	2	choose course of action, report
12	6	2	3	2	1	3	4	1	Attack:
12	6	2	3	2	1	3	4	1	Determine mounted or dismounted
8	6	2	2	2	1	3	4	1	Use direct fire, specify weapons
8	6	2	2	2	1	3	4	1	Assign targets, sectors, priorities
12	6	2	3	2	1	3	4	1	Call for indirect fire support
-	-	-	-	-	-	-	-	-	Request, lift or shift indirect fire
8	4	2	2	2	1	2	4	1	Use smoke
8	4	2	2	2	1	2	4	1	Use illumination
8	4	2	2	2	1	2	4	1	Use ilm/vis control measures and devices
8	4	2	2	2	1	2	4	1	Assault line - location and signal

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	COMPANY COMMANDER LEADER TASKS
6	4	2	2	2	1	2	3	1	Reach the objective: specify limit of advance, initiate exploitation, pursuit; apply direct pressure force, encircle
3	2	1	2	1	1	2	3	1	Consolidate:
-	-	-	-	-	-	-	-	-	Re-establish security
-	-	-	-	-	-	-	-	-	Fill key leadership positions
-	-	-	-	-	-	-	-	-	Man key weapon positions
-	-	-	-	-	-	-	-	-	Redistribute ammo and supplies
-	-	-	-	-	-	-	-	-	Clean up pockets of resistance
-	-	-	-	-	-	-	-	-	Designate sectors, positions
-	-	-	-	-	-	-	-	-	Clear fields of fire, OCOKA
-	-	-	-	-	-	-	-	-	Plan supporting fires, emplace obstacles
9	4	2	3	2	1	2	3	1	Occupy defensive positions:
6	4	2	2	2	1	2	3	1	Establish security
6	2	2	2	1	1	2	3	1	Recon the area
6	2	2	2	1	1	2	3	1	Select vehicle and automatic weapon positions
6	2	2	2	1	1	2	3	1	Mark and improve positions, dig in
6	2	2	2	1	1	2	3	1	Assign sectors of fire
6	4	2	2	2	1	2	3	1	Clear fields of fire
6	4	2	2	2	1	2	3	1	Identify enemy avenues of approach
6	4	2	2	2	1	2	3	1	Identify key terrain
6	4	2	2	2	1	2	3	1	Prepare cover, concealment, camouflage-ground and air
6	4	2	2	2	1	2	3	1	Emplace obstacles
6	2	2	2	1	1	2	3	1	Prepare alternate and supplementary positions:
-	-	-	-	-	-	-	-	-	Recon the area
-	-	-	-	-	-	-	--	-	Select and improve positions
-	-	-	-	-	-	-	-	-	Clear routes, rehearse movement
6	2	2	2	1	1	2	3	1	Make range cards, sector sketches, platoon overlays:
-	-	-	-	-	-	-	-	-	Vehicle positions, weapons and range
-	-	-	-	-	-	-	-	-	Dismount positions, weapons and range
-	-	-	-	-	-	-	-	-	Sectors of fire (primary, secondary)
-	-	-	-	-	-	-	-	-	Range to FPL, PDF
-	-	-	-	-	-	-	-	-	Terrain features, TRPs, EA
-	-	-	-	-	-	-	-	-	Dead space
-	-	-	-	-	-	-	-	-	Obstacles
9	4	2	3	1	1	2	3	2	Coordinate fire support plan
6	2	2	2	1	1	1	3	2	Coordinate with battalion fire support
-	-	-	-	-	-	-	-	-	Locate targets (coordination points, FEBA, EA, TRP)
-	-	-	-	-	-	-	-	-	Call for indirect fire (timing, type)
-	-	-	-	-	-	-	-	-	Call for adjustment of indirect fire
-	-	-	-	-	-	-	-	-	Arrange for coverage of obstacles

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	COMPANY COMMANDER LEADER TASKS
–	–	–	–	–	–	–	–	–	Use ground vehicle laser location designator
–	–	–	–	–	–	–	–	–	Implement illumination plans
4	6	2	2	1	1	3	2	2	Coordinate NBC plans
6	2	2	2	1	1	2	3	1	Coordinate between adjacent positions:
–	–	–	–	–	–	–	–	–	Sectors of fire
–	–	–	–	–	–	–	–	–	Location of dead space between units
–	–	–	–	–	–	–	–	–	Location of OPs
–	–	–	–	–	–	–	–	–	Placement of dismount teams
–	–	–	–	–	–	–	–	–	Plan coverage of obstacles
–	–	–	–	–	–	–	–	–	Maintain intervisibility
–	–	–	–	–	–	–	–	–	Identify patrols (size, type, timing, routes)
9	12	2	3	2	1	3	3	2	Conduct the defense:
9	8	2	3	2	1	2	3	2	Maintain fire distribution and control
9	8	2	3	2	1	2	3	2	Defend against long range targets
9	8	2	3	2	1	2	3	2	Defend against close in targets
9	8	2	3	2	1	?	3	2	Assign targets
9	8	2	3	2	1	2	3	2	Specify distributed vs. concentrated fire
9	8	2	3	2	1	2	3	2	Specify type fire (crossfire, frontal, depth)
9	8	2	3	2	1	2	3	2	Assign area coverage, responsibility
9	8	2	3	2	1	2	3	2	Maintain turret orientation, ready posture
9	8	2	3	2	1	2	3	2	Specify ammo type for combat load
9	8	2	3	2	1	2	3	2	Supervise movement to supplementary and alternate positions
12	8	2	2	2	2	2	3	2	Conduct retrograde operations:
12	4	2	2	1	2	2	3	2	Conduct a delay
12	4	2	2	1	2	2	3	2	Conduct a withdrawal, not under pressure
12	4	2	2	1	2	2	3	2	Conduct a withdrawal, under pressure
12	4	2	2	1	2	2	3	2	Conduct a retirement
12	4	2	2	1	2	2	3	2	Use timing in retrograde operations
12	4	2	2	1	2	2	3	2	Maintain security
12	4	2	2	1	2	2	3	2	Use deception
12	4	2	2	1	2	2	3	2	Use a DLIC
12	4	2	2	1	2	2	3	2	Plan fire support
12	4	2	2	1	2	2	3	2	Assign initial and subsequent positions
12	4	2	2	1	2	2	3	2	Conduct movement and choose routes
12	4	2	2	1	2	2	3	2	Use METT
12	4	2	2	1	2	2	3	2	Use passage of lines
6	4	2	2	1	1	2	3	2	Reorganization
									Reorganize personnel:
–	–	–	–	–	–	–	–	–	Make proper disposition of casualties (move, treat, evacuate), fill key leadership positions, fill crew-served weapon positions, send POWs to collection point, rest and feed troops, request replacements

TRPI	PRI	Mission Criticality	Criticality Survivability	Delay Tolerance	New Training	Performance Difficulty	Combat Frequency	Practice Requirement	COMPANY COMMANDER LEADER TASKS
–	–	–	–	–	–	–	–	–	Prepare weapons:
–	–	–	–	–	–	–	–	–	Troubleshoot, perform PMCS
–	–	–	–	–	–	–	–	–	Reload, redistribute ammo
–	–	–	–	–	–	–	–	–	Request ammo resupply
–	–	–	–	–	–	–	–	–	Prepare vehicles and equipment:
–	–	–	–	–	–	–	–	–	Troubleshoot, perform PMCS
–	–	–	–	–	–	–	–	–	Redistribute supplies
–	–	–	–	–	–	–	–	–	Request supplies, POL
–	–	–	–	–	–	–	–	–	Make repairs
–	–	–	–	–	–	–	–	–	Refuel
6	4	2	2	2	1	2	3	1	Submit status report
6	2	2	2	1	1	2	3	1	Indicate situation (location, position, estimate)
6	8	2	2	2	1	2	3	2	Report on personnel (casualties, wounded, missing)
6	8	2	2	2	1	2	3	2	Report on vehicles and equipment (POL, ammo, supplies on hand and needed)
6	4	2	2	1	1	2	3	2	Reconstitute the defense or prepare for the next attack
–	–	–	–	–	–	–	–	–	Re-establish security
–	–	–	–	–	–	–	–	–	Re-establish commo
–	–	–	–	–	–	–	–	–	Reposition vehicles, personnel, weapons
–	–	–	–	–	–	–	–	–	Cover sectors of fire
–	–	–	–	–	–	–	–	–	Replace camouflage and obstacles
–	–	–	–	–	–	–	–	–	Coordinate with adjacent units

BATTALION LEVEL TASKS
COMMANDER'S CONCEPT/ESTIMATE

1. **Mission**

   Tasks to be accomplished

   . Purpose to be achieved

2. **Situation and Courses of Action**

   A. Considerations affecting the possible outcome of actions

Characteristics of area of operations	weather, terrain, sociological political
Enemy situation	disposition, composition, recent/present significant activities, strength, pecularities and weaknesses
Friendly situation	disposition, composition, recent/present significant activities, strength, pecularities and weaknesses, status of equipment, supplies, training
Relative combat power	enemy/own strength vulnerability, maneuver units, supporting fires, mobility, terrain, dispositions, weather, logistics support, PSYOPS, electronic warfare, leadership

   B. Enemy Capabilities

Courses of action	capabilities, probabilities of action, exploitable vulnerabilities

   C. Own Courses of Action

Type of action – what	attack, defend
Time – when	begin, end
Location – where	assigned sector/defense, direction of attack/offense
Use of available means – how	maneuver elements, form of maneuver, formation, use of nuclear and chemical fires

   Purpose – why

3. Analysis of Own Courses of Action

        Advantages/disadvantages   enemy capacity to oppose,
                                              degree of resistance in face
                                              of opposition, degree of risk
                                              acceptability, active & passive
                                              means to reduce effect of NBC
                                              attacks, guerilla, air attacks

        Visualize   enemy power, movement, support-
                                              ing fires & attacks, smoke, air,
                                              reserves, consolidation, secure
                                              objective

4. Comparison of Courses of Action

        Conclusion on best probability   judgement, skill, experience
        for success

        Isolate significant factors   time, vulnerability, own dispo-
                                              sitions

5. Decision

        Courses of action   scheme of maneuver, supporting
                                              fires, command/elements of the
                                              command

        Staff estimates   supporting commander estimates,
                                              operations, personnel, intelli-
                                              gence, logistics, civil-military
                                              operations, deception, OPSEC,
                                              PSYOPS

EXECUTIVE OFFICER (XO)

Direct	Staff operating policies	formulate & announce
	Commander decisions and concepts	insure implemented
	Responsibilities	assign
	Represent commander	
Supervise	Master policy file & SOP	maintain
	Main command post operations	supervise
	Staff actions	review
Insure Coordination	Commander & staff	keep informed
	Liaison	insure, company XOs
	Information	keep informed on information passed directly to commander
	Staff sections	form and staff
Battalion Readiness	Replacement	weapons, operator crews
	Admin/logistic	CSS
	Subordinate commanders	CS

S1 – PERSONNEL (PERSONNEL ADMINISTRATION CENTER) (PAC) (ADJUTANT)

Unit Strength Maintence	Personnel estimate of situation	records, reports, battle/non-battle, administrative, personnel gain/loss estimates, command data, readiness, health, NBC loss
	Plans to maintain unit strength	replacement
Personnel Manpower Management	Replacement operations	(re)classification, (re)assignment, appointment, reduction, promotion, transfer, separation replacement, rotation
	Accounting	records, documents, corresondence, awards & decoration
Morale Support	Personal services	leave, rest & recreation, postal, religious activity
	Other	finance, welfare, legal
Health Services	Safety and accident prevention	
	Services	hospitalization, aid station, dental, veterinary, laboratory, preventive medicine
Discipline, Law & Order	Collect and analyze data	information, recommendations, AWOL, arrests, courts martial, desertion, transfer requests, stragglers
	Plan and supervise administration	rewards, punishments, MP, law enforcement, military justice, stockade
Civilian Personnel	Administrative support	procurement, administration, utilization
Prisoners of War	Enemy, civilian internees, detainees	capture, retention, safe-guarding, collection, evaluation

Headquareters Management	Site	selection, internal arrangement, space, shelter
	Support	administration, Red Cross, manpower
	Control	standarization of procedures

Production of Intelligence	Essential elements of information	effects of weather, terrain enemy
	Estimate & map	information in unit journal, intelligence summaries, prepare for orders, annexes, & plans, operational SITREP, battalion SOP
	Surveillance	plan & supervise location and emplacement of sensors & GSRs, ground & aerial OPs, subordinate unit OPs, support for aerial
	Reconnaissance	plan patrols, brief/debrief patrols, disseminate plans and reports, scouts, plan & supervise operations
	Target acquisition	coordinate, disseminate info to fire support agencies
	Report, receive/process information	other intelligence sources, higher, subordinate, adjacent, recommend tasking
	NBC battlefield	information, supervise, coordinate, fallout predictions, chemical agent detection, biological agent detection
Counterintelligence	Enemy capabilities	vulnerabilities, strengths, identification
	Countersurveillance	plans, personnel, supervise
	Signal security	wire, radio
	OPSEC	noise & light discipline, camouflage & concealment, identify targets within unit
	Physical security	weapons, equipment, vehicles, positions documents
	Information	censorship, cover vehicle markings, protect sensitive items, remove foreign nationals, police area, info on population, political and sociological institutions

	Threat evaluation	command vulnerability, hostile intelligence, NBC exploitation of captured personnel documents & materiel
Intelligence Training	Training plan	content of training, train the trainer
	Threat scenario	
	Inspections	
	Supervision	attached & supporting elements, battalion information coordination center (BICC)
Miscellaneous	Electronic warfare	type, plan, employment, targeting, execution, assess results, long range recon, monitor supporting units & elements
	Technical intelligence	maps, photomaps, photographs, terrain models, aerial maps
	Other operations	unconventional warfare, denial operations, camouflage ops
	Map requirements	acquisition, (re)production, distribution

S3 - OPERATIONS

Operations	Operations estimate of situation	tactical mission, characteristics of enemy, area of operations, availability of transportation, supply, equipment
	Command SOP	publish, prepare
	Operations plans and orders	plan tactical troop movements including march order, review plans and orders of subordinate organic and attached units, assignment of personnel & cadre, prepare overlays, appendixes, security, smoke, prepare estimate, post situation map, communication plan, prepare written order for commander, prepare for future
	Allocation and location of critical resources of command	priorities, ammo, personnel, supplies, nuclear/chemical load, equipment
	Command posts	supervise battalion CP, tactical operations center (TOC)
	Task organization	within command, subordinates
	Coordinate	with S4, S2, S1 use of resources, maneuver and support, unit replacements
	Control	fire, boundaries, command posts location, physical & operation security, information, MOPP
	Tactical operations	deep, close, rear areas, scheme of maneuver, reserves, air space requirements, bivouacking areas, records & reports
	Fire support	duties, liaison, plans execution, training, supervision, evaluation, location, priority, coordinate fire support plan with scheme of maneuver

	Coordinate	electronic warfare, CEOI, tac air, army aviation, nuclear weapons, air defense, engineers, MPs, denial ops, civil affairs, reserves, civil-military ops
Organization	Troop/unit list	organic, attached, OPCON, supporting, organize, equip, assign, attach, develop, TOE recommendattions, prioritize, replacement
	Force development	receive, orient, train, reorganize
	Reports	manpower, equipment, authorization, utilization, delegation of control
Training	Requirements	operations, garrison missions, training status, combat oriented, unit readiness, operational records & historical data
	Carry out training program	requirements, prepare schedule, budget, field exercises, directives, orders, CPXs, maneuvers
	Training resources	specify, allocate equipment, training ammo, unit school, school quotas, NETT, ranges, areas, facilities, training aids & devices
	NBC training	SOP, training, defense preparation, equipment
	Education and inspections	plan, conduct unit and individual proficiency and performance tests, training evaluations
	Records/reports	compile, maintain

S4 LOGISTICS (SUPPLY ADMINISTRATION CENTER) (SAC)

Classes of supply are divided into the following categories: I subsistence; II
clothing & individual equipment, tools; III petroleum, oil and lubricants, divided
into subclasses of fuels and packaged products; IV fortification and construction
materials; V ammunition; VI personal demand, health and welfare items; VII major
end items; VIII medical; IX spare and repair parts; X material to support non-military
programs and civil affairs; and posssibly XI water, maps, salvage and captured items.

Battalion Function	Advise	daily logistical status, spot battle loss, ammunition supply rates, POL forecasts, commander's logistics estimate, plans, operational responsibility for trains, headquarters movement
Supply	Priorities	intensity of combat
	Requirements for all classes	requisition, procurement, acquisition
	Supervision	accountability, security storage, records, stock control
	Distribution	method, movement priority, containerized vs break bulk packaging, coordinationg with subordinates
	Prescribed load list/ basic load	weapons, munitions, equipment, ground fuels, nuclear, chemical load, ammunition, machinery
	Resupply/consumption rates	build up, replacements
	Collection method/redistribution	excess, surplus, salvage
	Disposal	evacuation
Maintenance	Equipment readiness/status, serviceability	monitor, analyze, inspect, test
	Workload requirements	status, availability, priority, centralized vs decentralized control, direction, location
	Category of support	organizational, direct, general depot

	Resources	trained/skilled personnel, tools, training tools, diagnostic equiipment, calibration equipment
	Requirement	repair, evacuate, cannibalize, abandon, reclaim
Transportation	Classes	troop movement, personnel movement, equipment, supplies, salvage, captured enemy material
	Operations	concept of operations, organization, position, unit employmment, displacement, security, pickup/landing zone (air), cargo marking, nets, slings, rigging, civilian support
	Timing	date, priorities
	Routes	destination, main supply route, restrictions, order, distance, control, main supply routes, point of embarkation/debarkation
	Transportation mode	surface motor, rail, water, air, military, civilian
	Communication	command & control, status reports
	Purpose	personnel & administration, PWs, finance, losses, replacements, evaculation, hospitalization, supply distribution, other situationally dependent
	Type	unit trains, field trains, combat trains, composition, location security, damage control
Services	Facilities/installations	construction, location, engineering, mapping
	Food	mess team, time, place of issue, location, method of dispersal, items of supply, quantity
	Medical plan	evacuation, location & employment of aid station, communication, medical supply, medical personnel

F-11

Primary field services	graves registration, mortuary items, air drop
Secondary field services	laundry, bath, clothing exchange, bakery support, light textile & clothing renovation

APPENDIX G

COST AND INFORMATION EFFECTIVENESS ANALYSIS:
A COMPUTER AIDED APPROACH

The original Statement of Work on the Leader Trainer project required the use of a computer aided analysis of training device and performance interaction. The specific analysis, Cost and information effectiveness analysis: A computer aided approach, was prepared by J. K. Hawley et al., as Applied Science Associates, Inc. under contract to the Army Research Institute, in 1983.

Methodology and Purpose

The main objective of CIEA is "to provide a framework for selecting a preferred training device performance assessment capability (D-PAC) in terms of the worth of the performance status information provided versus the cost of developing, implementing and operating the capability." This is a four phase computer supported process, the elements of which are explicated below.

Phase 1

Establish the need for a D-PAC, defining the objectives of the capability, and identifying the constraints that will serve as a guide for the analysis. This defines the intial range of performances to be considered in the developmental effort.

Phase 2

Translate the objective statement into specific operational requirements.

Step 1. Define and weight Worth Dimensions (WDs). WDs constitute the primary value dimensions for the evaluation of D-PAC alternatives. They are defined, and rank ordered, and then weighted in relation to each other in terms of importance.

Step 2. Define performance objectives. Performances, conditions and standards are considered in development of a performance or task hierarchy.

Step 3. Map performances to worth dimensions. Since not all performances may be relevant to all worth dimensions, remove non-relevant performances from the evaluation.

Step 4. Define operational performance measures. Define each performance in terms of observables within the operational environment. Operational performance measures (OPMs) specify how individual/collective performance is to be measured and quantified.

Step 5. Obtain priorities data on performance. Performances are arranged in order of importance and criticality and service as initial input into a utility assessment.

Step 6. Establish utility of performance status information for selected applications. Define relative worth of status information on each performance for each WD by application of a hierarchical, multiattribute utility measurement (MAUM). Define performance heirarchy by rank ordering performances and weighting them in relation to each other.

Phase 3

Concept Definition. Integrate one or more training devices into a set of D-PAC alternatives. Training devices are listed, and annual frequency of use is listed.

Phase 4

Concept Evaluation. Characterize each alternative in terms of its effectiveness, and the extent to which an alternative provides complete and timely information on all performances relevant to D-PAC application.

Step 1. Obtain device capabilities matrix. Characterize each device in terms of its potential for performance assessment.

Step 2. Obtain measurement precision ratings for performance domains. Reflect utility of receiving status information on the performances at frequencies indicated.

Step 3. Input frequency utility ratings for performance domains. Reflect utility of receiving status information on the performances at frequencies indicated.

Step 4. Obtain performance context matrix. Characterize each device in terms of its coverage of performance context variables (PVCs). PVCs are condition variables or target variables used to provide quantitative indices of the degree to which each device provides a vehicle for realistic performance assessment under conditions likely to be encountered in an operational environment. PVCs are weighted to reflect relative importance (PVC importance vector); each device is characterized on the basis of its coverage of the PVCs (obtain device coverage incidence matrix), and on a performance relevancy matrix, because not all PVCs are relevant in the assessment of all performances.

After all of the data on performances, devices and condition variables has been entered into the computer, and after the ratings and weightings have been performed, a series of computations are executed by the computer. The steps in developing the final information utility matrix are based on those which come from producing the intermediate or submatrixes. The final matrix is derived from the following steps:

1. Obtain Absolute Coverage Matrix: PVC importance vector x device coverage matrix.

2. Compute Normalization Constants: weighted context variable coverage relative to each performance.

3. Obtain Relevant Coverage Matrix: absolute matrix screened through relevant coverage, which lead's to weighted PVC coverage by devices.

4. Obtain Performance Context Matrix: reflect weighted proportion of context variables relevant to specific performance.

5. Obtain Pevice Measurement Matrix: integrate precision ratings and performance context ratings to form device measurement effectivenesss scores (DME).

6. Obtain Alternate Measurement Effectiveness (AME) Matrix: combine DME ratings across devices to obtain effectiveness ratings for D-PAC alternatives.

7. Obtain Alternative Effectivness Matrices: integrating AME scores which reflect device capabilities and the precision of performance assessment with frequency of utility ratings to obtain alternative effectiveness ratings.

8. Form Partial Information Utilities Matrix by combining alternative effectiveness ratings across performances to obtain partial information utility (PIU) scores for each alternative on each WD.

9. Compute Information Utility Scores for Alternatives: PIU scores combined across WDs to obtain information utility (IU) scores for each D-PAC alternative.

This last matrix is intended to provide an assessment of the relative standings of each of the training devices with respect to the objectives, performances, and conditions.

Use of CIEA Program

Several attempts were made to utilize the CIEA program for analysis of the Leader Trainer data but a number of problems were encountered. Some of the difficulties were conceptual, where the rating and weighting process was questionable, and other problems concerned the amount of data generated by the Leader Trainer project and the difficulty of fitting it into the format required by the CIEA process. These problems tended to interact. Some of the more critical of these problems will be described in the following paragraphs.

Pata Related Problems

A great portion of the leader trainer data had been generated from criticality, importance, and practice frequency ratings performed by leaders at various positions. Consequently, the tasks had already been rated on a number of the same dimensions as required by the CIEA analysis. The data has

been treated already to take into consideration some of the other variables
mentioned in the CIEA program. The original leader trainer task data base
emerged from the Training Developers Handbook analyses rank ordered tasks
according to a combination of a number of variables; the CIEA program required
use of similar variables, but the recombination tended to change the meaning
of the original data analysis.

The first data category required for the analysis was that of Worth
Dimensions. For tactical leadership skills, sustainment training and initial
training are the most important variables although it would have been desire-
able to have included unit readiness, transition/cross training and training
management. However, this many dimensions would have created too great a data
base for the computer so some had to be eliminated.

Next, the worth dimensions selected are to be rank ordered and weighted.
The rank ordering can be well determined based on the training objectives, but
the relative weighting is arbitrary and very subjective. In the weighting
process, the computer procedure assigns to the lowest ranked worth dimension a
default value of 10. The other, higher ranked dimensions are then weighted on
the basis of how much more important they are than the lowest ranked dimension.
Ratings are normalized and converted to a 1 to 100 scale. There is no empirical
basis for stating that, for example, sustainment training is 40% more desireable
than initial training rather than 50% more desireable; however, the program
requires these kinds of judgements. A decision on the relative values of
worth dimensions varies with the situation and with training status and
different raters would offer very different interpretations of the relative
importance of different dimensions. Additionally, different numbers of worth
dimensions would result in different weightings for those used.

The next step required the definition of performance objectives. This
is the list of tasks which need to be covered by the training devices. In the
leader trainer analysis, there are three separate lists of tasks from the
squad leaders, the platoon leaders, and the company commanders, with only
minimal overlap from one list to the next. The lists can be arranged in a
hierarchical manner as required in the program, but that arrangement obscures
the hierarchical nature of the original data where the rank order was based on
the interactions of the original ratings rather than by task components. The
CIEA hierarchical process requires categories and subcategories; the original
data consists of both, with some subcategories more important than other main
categories. Combining the performances within task heirarchies destroys some
relevant data, and rank ordering of the performances within categories gets
further away from the original data. Additionally, as with the worth dimen-
sions, weighting of the relative importance of the performance steps within
categories is very subjective.

The next step, defining training device alternatives, presents no particular
problems because of the relatively limited number of devices available or
potentially available for the Bradley Fighting Vehicle. However, characterizing
the devices in terms of performance assessment is a problem. There are some

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devices which as presently configured do not offer coverage of a particular performance but with some modification they could be adapted to do so; others not designed for the measurement of a specific performance will nevertheless permit measurement of that performance. Other devices have not yet been fielded and their capabilities are either unknown or potentially so variable that categorization on this basis would be relatively meaningless.

Device measurement precision presents a problem for the reasons already mentioned, and because of the varying nature of the devices. The computer assisted devices can be very precise; their relative value is a function of the adequacy of the performance coverage. Some of the other devices cover the performance more fully, but because they are instructor critiqued, offer less precision, due to human error and the difficulties of scoring some items. Furthermore, if a device was not designed to train a particular skill, but can in some way be used in the assessment of performance of that skill, the measurement potential is either unknown, or at best a guess which cannot be made with any degree of precision. The ratings are again not very reliable.

Frequency utility is based on the usefulness of frequent status reports on the performances or tasks. The leader trainer data has already been adjusted for performance and practice frequency. Further, such frequencies are a function of personal opinion, command emphasis, the training status and facilities available, the mission or state of combat readiness of the unit, the time remaining before an ARTEP, etc. No one standard can be defined; therefore any frequency of reporting status is a subjective judgement, variable with the individual making it.

Deciding on performance context variables is not difficult, particularly since the leader trainer data has already been analysed in relation to some condition variables, but ranking them and assigning weights causes problems similar to those expressed above. There is no empirical basis for determining that, for example, target characteristics are more or less valuable than relative degrees of visibility.

The only problems encountered in characterizing devices on their coverage of PVCs is for those devices which have not yet been fielded. It is difficult to determine with any degree of precision which performances and conditions could be designed into them; there is also no provision for modification of existing training devices to add coverage of these performances.

The performance relevancy matrix involves eliminating some PVCs because they are not relevant to particular performances. Howwever, to the extent that all the tasks are interrelated, all of the PVCs are relevant and the step is not useful.

In summary, the entire rating/weighting process seems questionable in its application to the data derived from the leader trainer analysis which resulted from application of the steps in the Handbook for Training Developers. Many of the steps of the CIEA process are subsumed in the final training requirement priority index (TRPI) and practice requirement index (PRI) computed for each of the squad, platoon, and company commander lists. Furthermore, the weighting

process required by the CILA masks the relative standings of the tasks on the TRPI and PRI lists. The tasks within the lists cannot be grouped and combined, nor can they meaningfully be given equivalent weights.

In addition, no two raters would have any basis on which to make comparable ratings; one individual's ratings would probably change over time and repeated ratings, due to forgetting. Further, if an error in assessment or even an undetected typographical error is made it will impact on the entire program as the computational matrixes are interrelated and each succeeding one builds upon another previous matrix. There is no capability for printing out the intermediate steps to check or verify the data base.

Computer Related Problems

Other problems occurred as well. When the program was first attempted using the squad leader list of 27 tasks, the number of tasks entered to be used as performances and the number of PVCs was evidently too large; the computer could not process all of the information and the computational process stopped. The data discs were full, and no further activity could occur. This created two problems. First, and obviously, any cutting of the list would degrade the results. Attempts to reorder the list of tasks, or group them, changes the data base in an unacceptable manner. Secondly, when the "disc full" message was received, all computation stopped and no further work could be done. The matrixes build upon each other in series, and cannot be completed independently.

The computer stopped processing during the computation process without advance warning; all of the previously entered numbers and ratings were lost, and had to be reentered. Entering data is a very time consuming process as each entry requires several steps, and the methods used for error correction are time consuming. The program retains some data from one iteration to the next, but weightings and rankings are lost, and PVCs that have been deleted must be deleted again.

The CILA process was then repeated several other times, with smaller lists of performance steps, and several other problems emerged. On one occasion, a programming error surfaced after the third matrix was printed; expert assistance was required to overcome the error. On two other occasions, the computer stopped processing during the performance hierarchy data input; a computer programmer was unable to find the syntax error. On a final attempt to run the program, the computer stopped processing during the frequency utility step; the computer expert was again unable to determine the problem within a reasonable length of time. Also, the manual contained two errors. One, of a typographical nature, was relatively easily corrected despite the fact that it concerned a keyboard command; the other was more substantive, and although not serious, created extra work and caused a good bit of confusion and delay.

The tables and matrixes produced at the end of the computations, both the intermediary tables and the final product are very difficult to comprehend, even with the specifics of the program at hand. Explanation of any of the matrixes or the data therein would be impossible to anyone who was not very

familiar with the computer program and its substeps. A still unexplained problem with this data arose in the matrix development when the computer processed matrixes on four worth dimensions, when only two had been entered.

Furthermore, the CIEA shows only the relative effectiveness of a specific set of devices on a specific set of performances or tasks; any additions or deletion of elements or devices or condition variables would require recomputation and reentry of all the data.

Conclusions

Although the CIEA program may have some utility for some kinds of data, it is not readily adaptable to the data generated by the initial leader trainer analysis. Any attempts to restructure the data to fit the program tend to change the data base in a way that unacceptably changes the effects and the results of the inital analysis.

For all of the above stated reasons, the CIEA analysis was not utilized in the analysis of the Leader Trainer data; the reader is referred to Tables 11 through 16 on pages 70 through 85 for comparable, but more readily understandable analysis of the relationship between the Bradley leader tasks and the available and projected training devices. The essential elements of the CIEA analysis are retained, but in a format that does not require restructuring of the data base.

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